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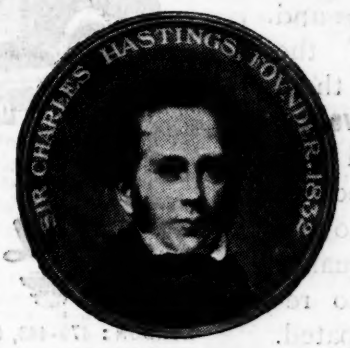

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A Clinical Study
OF
THREE CASES OF HEART-BLOCK.

BY

T. WARDROP GRIFFITH, C.M.G., M.D., F.R.C.P.,

PROFESSOR OF MEDICINE, UNIVERSITY OF LEEDS; HONORARY PHYSICIAN, GENERAL INFIRMARY AT LEEDS.

THE three cases of heart-block which form the subject of this communication present certain features of interest. In the first, a block which remained complete for a long period suddenly broke into a two to one block and ultimately passed off altogether. In the second case, though the vexed and difficult question of whether the block was partial or complete arose from time to time, there certainly were periods when the block was of the former character, and it was mainly during these that the tracings I discuss here were taken. The phenomenon of ventricular "escape" is shown; an auscultatory sign is mentioned to which I have elsewhere referred;[1] the effects of amyl nitrite and of atropine are discussed, and tracings are shown which demonstrate the occasional occurrence of "flutter" of the auricle. The third case is put on record not only as an example of complete heart-block with an unusually slow ventricular rhythm, but on account of the large number of attacks of the Adams-Stokes character, during some of which satisfactory tracings were obtained. In this case also, simultaneous tracings of the pulse and of the respiration showed a remarkable relation between the periods of asystole and those of the apnoeic phases of the Cheyne-Stokes respiration when that was present.

CASE I.

W. R., aged 60, a gardener, was admitted under the care of my colleague, Dr. Watson, to whom I was indebted for permission to study the case and who has also kindly allowed me to publish the results of my investigations. Four months before admission he felt giddy when at work; this feeling was transient, but recurred in a fortnight and then almost every day. He became very conscious of the beating of his heart and volunteered the information that its action had become very infrequent. He was a temperate man and moderate in the use of tobacco. He had had rheumatic fever when he was 38 years of age; there was no evidence of syphilis. His complaint was of some measure of breathlessness and of a feeling of oppression over the heart. The arterial walls were thickened; the apex beat was forcible and it was external to the nipple line; a systolic bruit was audible with its maximum at the apex and was also heard at the aortic and pulmonary areas, but there was no clear evidence of a valvular lesion. The pulse was regular and infrequent; from the date of his admission till the twenty-eighth day of his stay in hospital the pulse never exceeded 36, and it was counted as low as 24. On the twenty-eighth day of his stay in hospital he detected a change in the frequency of the heart's action. On counting the pulse he found it was 48; shortly before he had counted it at 24, and his report at a later period of the same day was that "it was running backwards and forwards from 44 to 68 and 70 and upwards, but was never keeping to one regular beat."

The tracings shown in Figs. 1 to 5 were taken on the same day during the former of these two phases. The

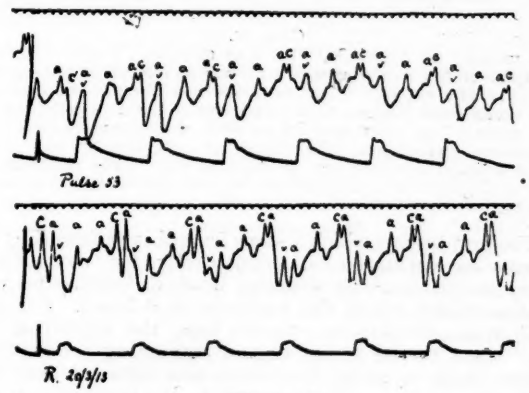

FIG. 1.

upper tracing of Fig. 1 might readily be interpreted as an example of a partial block in which every third auricular stimulus passes to the ventricle. The lower tracing, taken by itself, might also bear that interpretation, though an undoubted lengthening out of the *a–c* interval as the tracing is read from left to right ought to arouse one's suspicions of the block being a complete one. When, however, the upper and lower tracings are viewed in relation to one another, the evidence in favour of the block being a complete one is very strong. The *a–c* interval is much longer in the lower than in the upper tracing, and a partial block would not account for this. On the other hand, if the block were a complete one it is clear that a *temporary* acceleration of the auricular rate would result in this interval being lengthened. The diagram in Fig. 2 explains this.

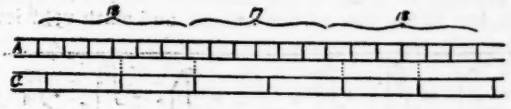

FIG. 2.

I have elsewhere[1] discussed the difficulties, sometimes I believe insuperable, which await the attempt to distinguish between a partial and a complete auriculo-ventricular block. In this case it is not a difficult task. If, in any case where the question arises of there being a two to one or a three to one heart-block, a long tracing is taken, and it is found that variations in the frequency of the auricular contractions are slavishly followed by similar variations in the ventricular rate, this will be accepted as confirming the partial nature of the block. If, on the other hand, in spite of variations in the auricular rate, the ventricle goes on the even tenor of its way and beats with perfect regularity, we may regard the block as being complete. It is true that in cases of complete block there is nothing to prevent the auricular rate happening to be exactly twice or three times that of the ventricular rate, but the arm of coincidence would require to be a very long one for this relationship not to vary in a tracing taken over a period of many minutes. Still I have seen it occur, and it is sometimes a good plan to get the patient gently to inhale some ammonia, which has the effect of increasing the auricular rate. Light may thus be thrown on the relationship between the auricular and ventricular contractions. Fig. 3 shows the result of this

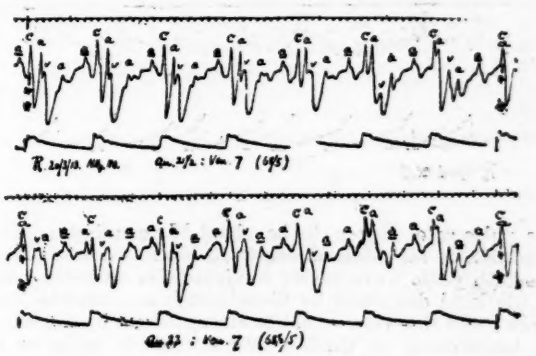

FIG. 3.

experiment. At a time when the auricle was beating exactly three times the rate of the ventricle, the patient was directed to inhale a little ammonia. For some time, but only for the period of a few beats, the auricle went on beating at the same rate; then the beats became rather more frequent. As it was observed that the ventricular rate was not affected in the slightest degree, confirmation was obtained of the complete character of the block. In the upper tracing of Fig. 3 it will be seen that every third auricular wave—and this I have underlined—"falls back" from the "*c*" which comes after it, and in this way the seven radial periods between the two asterisks are equal to twenty-one and a half inter-auricular periods. With the increase in auricular rate in the lower tracing it is seen that seven radial periods correspond to twenty-two interauricular periods. Throughout, the ventricle beats with remarkable regularity.

But in this case the completeness of the block was obvious without artificial means. Later in the day the

tracing shown in Fig. 4 was obtained. The block is manifestly a complete one, and it will be seen that at every fourth cycle auricle and ventricle contract at the

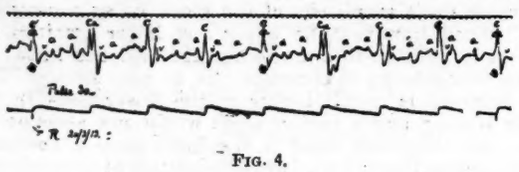

FIG. 4.

same moment. While this relationship prevailed a tracing was taken over the apex beat, and this is shown in Fig. 5. The position of some of the auricular waves is open to doubt, but in the case of the second and sixth ventricular

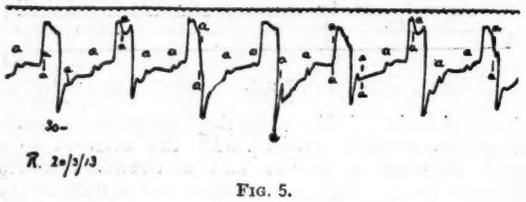

FIG. 5.

impulses it is clear that the systolic plateau is dimpled by the drag of the contracting auricle, while in the case of the third and seventh the end of the plateau is modified. Some may see a difficulty in accepting the view that the plateau of a powerfully contracting ventricle can be dimpled by the action of the auricle, but this dimpling of the plateau does not represent any victory of the auricle over the ventricle. Here there is no question of which is the stronger; the greater part of the ventricular force is engaged in driving blood into the aorta, a small part of it only in maintaining the forward thrust of the apex. This contracting ventricle is drawn back as a whole from the chest wall by the drag of the auricle in systole.

The sudden increase in the pulse rate noticed by the patient on the twenty-eighth day of his stay in hospital has been mentioned; for about thirty-six hours the rate varied from about 36 to 68 or 70. On the day on which the alteration in rate was observed the tracing shown in Fig. 6 was obtained. Calculated from the slow rhythm

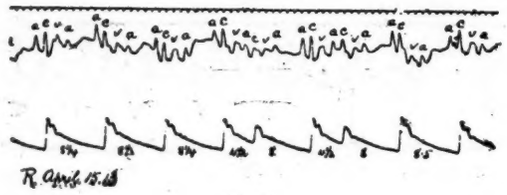

FIG. 6.

the pulse rate is seen to be about 36 per minute. If the condition is still one of complete block, we must regard the fifth pulse wave as the expression of an extra-systole of the kind described by Wenckebach in complete heart-block; and this view would be strengthened by there being no lengthening of the *a–c* interval which leads to this fifth systole as might be expected if two auricular stimuli got through in succession, as well as by the next radial period being practically equal to the customary long radial intervals. Still I incline to think that the condition is really one of a two to one heart-block with the occasional passage of two auricular stimuli in succession, and this

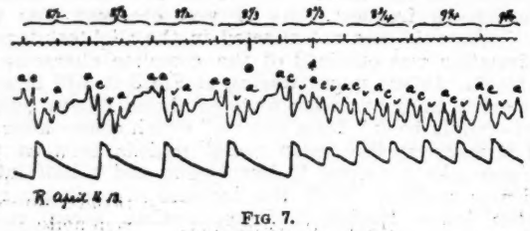

FIG. 7.

appears to be borne out by the two tracings which I took the following day. Figure 7 shows what I take to be a change from a two to one rhythm to one in which every auricular stimulus passes to the ventricle. Calculated on the slow rate the pulse is about 36; when every stimulus gets through the auricular rate very soon falls slightly, and this is reflected in the rate of the ventricle, for towards the end of the tracing it will be seen that the time

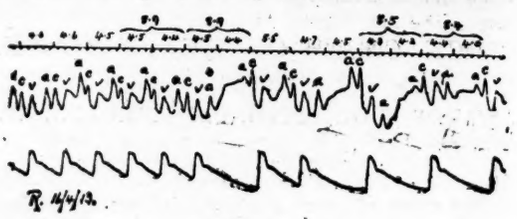

FIG. 8.

occupied by two radial periods is rather greater than that occupied by one period of the slow rate. Figure 8 shows the converse of this—a change, that is to say, from the fast rhythm to the slow. Here it is to be observed that shortly after the blocking of every second stimulus from the auricle, the auricular rate increases. I think that in these variations we may see an expression, though at first sight not perhaps a very obvious one, of the well known relationship between the blood pressure in the medulla and the frequency of the cardiac action. When the blood pressure rises the cardiac systoles are lessened in number by vagus influence; when it falls, the removal of that influence leads to their increase. This influence of the vagus is of course exercised primarily on the auricle, and it is the rhythm of this chamber which must be studied in this connexion. In Fig. 7 the sudden increase in the number of systoles due to the passing of the block will tend to raise the blood pressure; this in turn will lead to a slowing of the auricle, which will result in two radial pulse periods of the rapid phase being slightly greater than one of the slow phase. So also in Fig. 8 the blocking of auricular stimuli after the middle of the tracing will primarily tend to lower arterial blood pressure, and the quickening up of the auricle which soon follows may be regarded as being the result of this, and also an adaptive effort to combat the lowering of pressure.

Two days afterwards the condition was that shown in Fig. 9. Every auricular stimulus passes through, but there remains some lengthening of the *a–c* interval. There was no recurrence, and the man went home after a few days of this normal rhythm. I heard from his

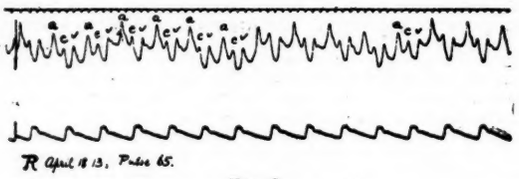

FIG. 9.

medical man some time afterwards that he had again had an infrequent pulse for some three weeks; that this suddenly passed off, the pulse rising to 120 and then in ten minutes falling to 80. He died some months after this without any obvious cardiac symptoms, and I understand that he had abdominal discomfort and emaciation.

CASE II.

A woman of about 38, who was admitted under my care complaining of dyspnoea and who was conscious of the cardiac action. The systolic blood pressure was 250 mm. of mercury and sometimes higher, and there was a trace of albumin in the urine. The pulse was infrequent, sometimes regular and sometimes irregular. The degree of irregularity was sometimes enough to strike one at once, and on some occasions it was so slight that it could not be detected without instrumental means.

The first tracing which I show from this patient (Fig. 10) reveals an impairment of conductivity, for not only is every second auricular stimulus blocked, but the passage of those which reach the ventricle is delayed. I find it is often an advantage to measure from the summit of the "*a*" wave to the radial rise in estimating conductivity rather than to adopt the usual measurement from the beginning of the auricular wave to the beginning of the carotid.[1] For reasons which I need not mention here the beginnings of both these waves may be obscured. It is clear that the block is not a complete one and that the auricular rate is dominating the ventricle. In the first

place the ventricular rate is 47, which is high for a complete block, and in the second place the relationship which is shown in the figure between auricle and ventricle was preserved over a long tracing.

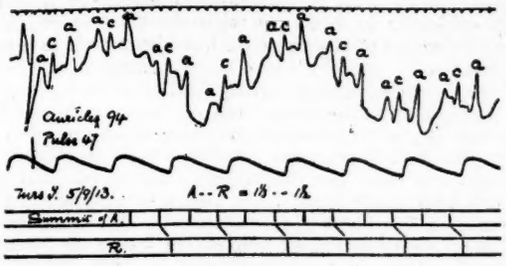

FIG. 10.

In the next tracing (Fig. 11) the auricle is beating less frequently—that is to say, at 54 and not at 94 a minute. At the time this tracing was made most of the auricular stimuli got through in spite of the fact that some of them were premature, a condition inimical to transmission; but

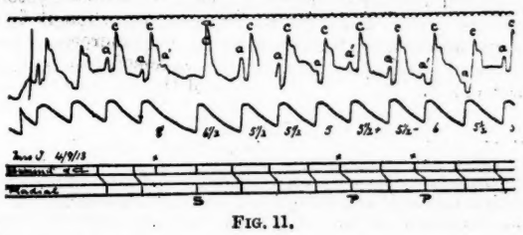

FIG. 11.

at one point it will be seen that a contraction of the auricle has indeed failed to reach the ventricle, probably because it is more premature than the others which are only associated with an increase in the *a–c* interval. With the auricle beating at 54 instead of at 94 the blocking of one stimulus from the auricle will give the ventricle a much longer time in which to build up its stimulus material to the flash point, and this is more than enough, for its systole occurs eight fifths of a second after the previous beat—that is, as it so happens, at the same time as the auricle contracts, and of course at a time that it cannot be attributed to this event. This phenomenon is not uncommon in cases of partial block and is by Einthoven referred to as "ventricular escape."

The next tracing (Fig. 12) shows the blocking of stimuli becoming rhythmical. One of these is premature. The

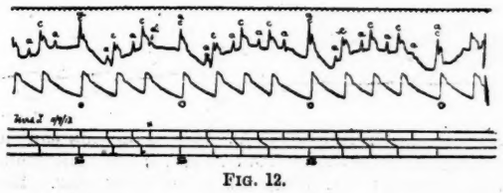

FIG. 12.

escaped ventricular contraction occurs synchronously with the auricular contraction, and this gave rise to an alteration in the first sound of the heart. There was usually a faint systolic bruit at the apex, but when in consequence of ventricular escape auricle and ventricle contracted at the same time the first sound became loud and thumping and the bruit was not audible. When in a case of infrequent cardiac action the first sound shows this alteration, either rhythmically or irregularly, one may strongly suspect either a partial block with escape of the ventricle or a condition of complete block. The black dots under the radial tracing indicate beats which were announced as being loud by an observer who was confining his attention to that one point. He did not give his signal, however, at one point when the two cavities contracted together, and this I have indicated by a small circle.

Effect of Amyl Nitrite.

As I had found that inhalation of amyl nitrite caused a partial block to be overcome, I decided to make the test in this case, but on examining the patient before doing so I found the heart so nearly regular that I was unable to make out the slight irregularity which existed without instrumental means. I also found that the characters of the pulse in the veins of the neck had entirely changed (see Fig. 13). The waves referable to the auricle were now 266 per minute, while the ventricle was beating so

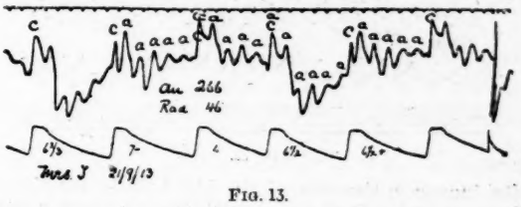

FIG. 13.

infrequently that the pulse was about 46 and the radial spaces varied from about six to seven fifths of a second. The condition was clearly that known as "flutter," and for reasons I need not mention at present I am in some doubt whether the block was a complete or a partial one. Inhalation of amyl nitrite did not at first produce any effect on the auricle, which continued to give rise to 266 waves per minute. The radial pulse increased to 55 (see Fig. 14). If the block was a partial one this might

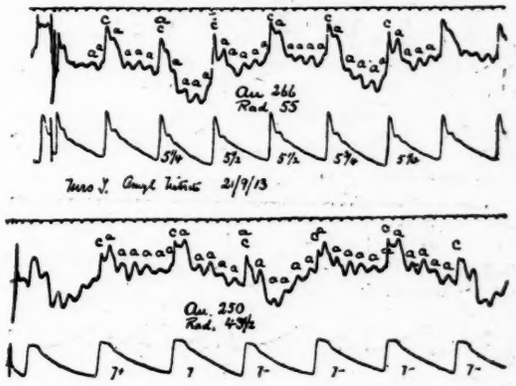

FIG. 14.

be due to auricular impulses getting through more frequently from the improvement in conductivity which occurs from amyl nitrite; if, on the other hand, the block was a complete one, the action on the ventricle must be of a more direct nature. In a few seconds the auricular waves fell to 250 and the pulse to 43½ per minute.

I waited till this condition of auricular flutter had passed off before I considered that I had an opportunity of trying

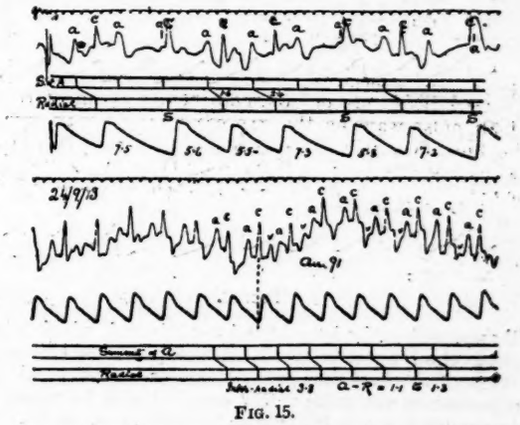

FIG. 15.

the effect of amyl nitrite on conductivity. In the upper tracing of Fig. 15 it will be seen that the auricle had resumed its normal action; it was beating at 65; there were escaped beats of the ventricle following on blocking of stimuli, and the *a–c* interval varied from 1.6 to 2.4 fifths of a second. Inhalation of amyl nitrite at once increased the auricular rate to 91 per minute. Yet in spite of this great demand on the conducting function of the bundle every impulse was transmitted; not only so, but the time of transmission was lessened, as will be seen on comparing the two tracings. The next tracing (Fig. 16) shows that the effect on the conducting function of the bundle began to pass off before the effect on the auricular rate; for

while this remains at 91 we find a progressive lengthening of the *a–c* interval until this culminates in a block. This tracing also gives evidence that the inhalation of amyl

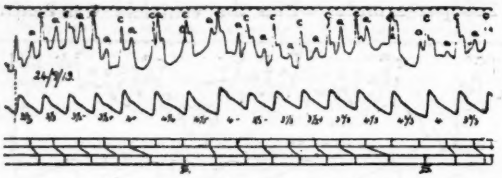

FIG. 16.

nitrite increases the rate of the idio-ventricular rhythm, for it appears that if the ventricle is left to itself it enters into contraction at the end of a period of about four and a half fifths of a second.

Effect of Atropine.

On another day I tried the effect of atropine on the function of conductivity. However, on taking a preliminary tracing I found that the auricle was again in a condition of flutter. This passed off in about an hour, and the two tracings seen in Fig. 17 were taken. The

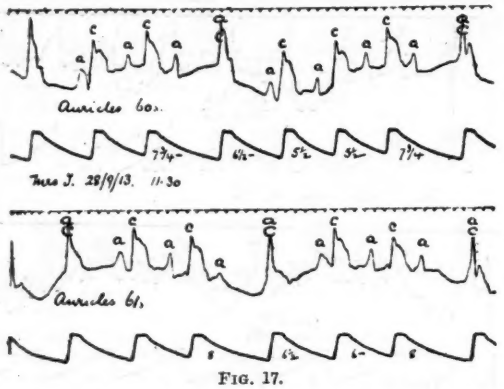

FIG. 17.

auricles were beating at 60 and 61, and every fourth or fifth stimulus was blocked. One-fiftieth of a grain of atropine sulphate was then injected subcutaneously; in fifteen minutes all the stimuli from the auricle passed through to the ventricle. This is seen in the upper tracing of Fig. 18. Some impairment of conductivity is indeed

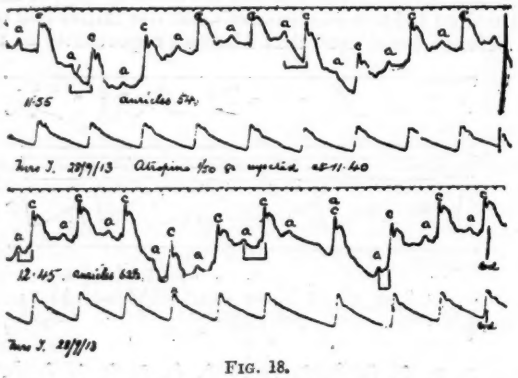

FIG. 18.

still apparent in the lengthened *a–c* interval, which slightly exceeds the longest intervals in the previous tracing, but in view of the fact that every stimulus is now passing the comparison is not quite a fair one. It will be noted that the auricles are now beating at 54 instead of at 60. This is not the first time I have found atropine produce this effect in the earlier stage of its action,[2] and it might be suggested that the passing off of the block is attributable to a lessened demand on the function of the conducting structures in consequence of this slowing of rhythm. The lower tracing gives the answer to this, because here the auricular rate has gone up to rather more than it was before the injection, and yet, though there is some return of blocking of stimuli, there are long runs where every stimulus reaches the ventricle. Here also, as with amyl nitrite, the effect of the drug is more evanescent in respect of conductivity than in respect of the auricular rate.

SUBSEQUENT HISTORY OF CASE II.

The patient remained in hospital many months, and a great many tracings were taken. A very common rhythm was that shown in Fig. 10, with every second auricular stimulus blocked. At other times the block was clearly a complete one, with a regular ventricular rate of 37 to 40—a rate which is in harmony with the time at which the sporadic escapes of the ventricle have been seen to occur.

About twelve months after her discharge from hospital she was again admitted, having had a sudden attack of left hemiplegia without any loss of consciousness. Both arm and leg were affected, but the weakness was not great; at first there was neither hemianaesthesia nor hemianopsia, but the hemiplegia increased and soon became associated with both these symptoms. In the course of a few days she suddenly became unconscious; very soon Cheyne-Stokes respiration came on, followed by death. During the last days of her life the tracings showed a condition of partial block in which the passing of a stimulus was regularly followed by the blocking of the next, which in turn led to an escape of the ventricle. In this way the radial tracing presented a series of long and short periods, the long ones being rather less than two interauricular spaces, and the short ones being rather more than one interauricular space. Shortly before she died the pulse went up to 85, and though no venous tracing was taken there can be no doubt that, so far as the actual passing of stimuli is concerned, the block had disappeared.

CASE III.

T. M., a labourer, aged 50, was admitted under Dr. Churton, to whom I am indebted for permission to use the case. Alcoholic excess for years; no history of syphilis. Three weeks before admission, at a time when he was not exerting himself at all, he had an attack of loss of consciousness and is said to have been convulsed. He was able to get home by himself. On admission he was found to be the subject of general atheroma; there was great enlargement of the heart; the blood pressure rose during the systole to 210 and the pulse was anacrotic. The radial pulse was regular and about 22 per minute. At the apex a systolic bruit was heard which varied very much in distinctness from beat to beat, and which at times was inaudible, the first sound being then loud and thumping. This last sign, pointing as it does to a simultaneous systole of the auricle and ventricle with some of the heart-beats, led to a diagnosis of *complete* heart-block.

Figure 19 shows tracings of the jugular pulse in the upper and of the apex beat in the lower record, the radial pulse

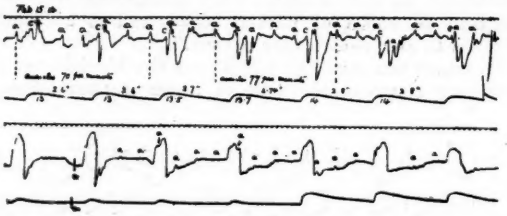

FIG. 19.

being also shown in each case. It will be seen that though the auricular rate varies from 70 to 77, the ventricular rate is not affected; the block is a complete one. He then began to have long periods of asystole with, after some little time, tonic and clonic convulsions following on loss of consciousness. Of these attacks I saw an immense number; the majority of them conformed to the following description, which I quote from my notes made at the time:

"While lying quietly in his usual condition, the pulse stops quite suddenly; he becomes pale, and looks as if he were going to die. I think the respiration becomes less full. Then, after a varying period, usually about fifteen seconds, he becomes unconscious. To test this I was in the habit of getting him to repeat numbers or letters after me; he would become confused in his utterance over one or two letters or numbers, and then all response would cease. Following very soon on the loss of consciousness, in about two or three seconds that is to say, he begins to have slight tonic spasm, the face being usually turned from the left towards the right, and the head slightly raised from the pillow. Some alteration of expression of the face suggestive of pain is usually noticed. Then, quite suddenly, and *before* the disappearance of the tonic spasm, the pulse returns, the first beat as a rule being quite strong and full; at once the face assumes its normal colour, and in a second or two becomes redder than usual. About the same time the tonic spasm, which lasts only a few seconds, passes off, and the head may again rest on the pillow. Then, almost at once, clonic

spasms of moderate violence come on, and after these have lasted a few seconds he usually puts his hands to his head and complains in a confused voice of pain in the head before all the spasm has passed off."

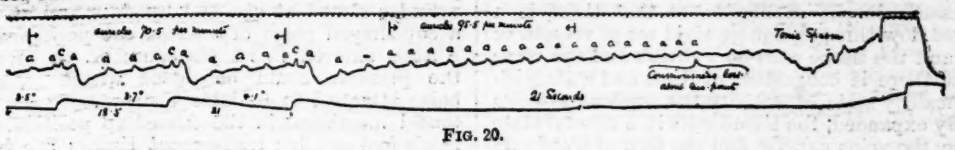

FIG. 20.

The tracing shown in Fig. 20 was taken during one of these attacks. The increase in the auricular rate during

FIG. 21.

the period of asystole is well seen, and is doubtless the expression of the fall in arterial pressure. The duration of asystole is twenty-one seconds; the point of time at which consciousness was completely lost is indicated, and it will be seen that the tonic spasm interfered with the record from the venous pulse.

His pulse, which as I have said was about 22 on admission, tended to become less frequent, and Fig. 21 was taken at a time when the pulse rate had fallen to 9 per minute. Sometimes long pauses of ten or eleven seconds occurred, and towards the end of these pallor, without unconsciousness, prevailed.

Apparently in connexion with the long periods of asystole—and here I refer to those which were not associated with convulsion or with loss of consciousness—Cheyne-Stokes respiration was present. The relation was constant and peculiar, and it is shown in Fig. 22; the period of apnoea does not begin until after that of asystole has passed off; there is sometimes an interval of a few seconds between the two phenomena; they never coincide in time. I am not aware that this relationship has been formerly noted. In this tracing the return of the pulse is of the staircase variety. I have looked through my many tracings, but find, as I have already mentioned, that as a rule the pulse returns with a full beat.

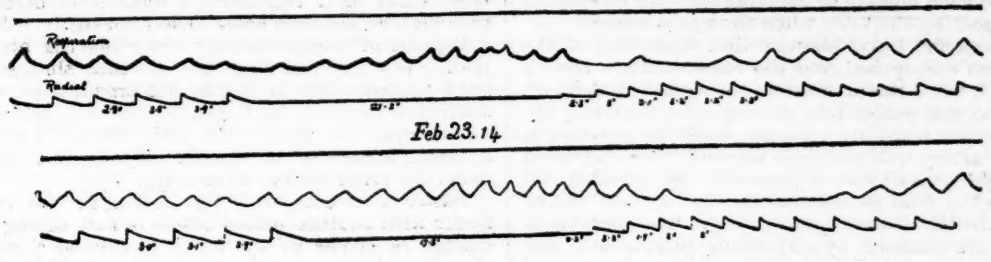

FIG. 22.

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[1] *Heart*, vol. iii, No. 2. [2] *Quarterly Journal of Medicine*, vol. iii No. 10.

A Lecture

ON

CAPILLARY PRESSURE AND OEDEMA.*

BY

LEONARD HILL, M.B., F.R.S.

IT is generally held, both in physiological and pathological teaching, that the transudation of fluid through the wall of the capillaries is due to the pressure of the blood within these vessels—that is to say, to the force of the heart beat. The average capillary pressure is taken as something between 20 and 30 millimetres of mercury, and it is suggested that this pressure is sufficient to overcome the osmotic force which is found to be exerted through gelatine membranes by the proteins of the blood and separate the water and crystalline substances which pass out from the capillaries into the tissues. According to the modern theory of the secretion of urine, it is assumed that such filtration takes place through the Malpighian capsules, and it is supposed that to maintain this filtration and to overcome the osmotic pressure of the colloids the pressure within the glomerular capillaries is about 20 per cent. less than that in the aorta. The assumption that there is any such high pressure within the capillaries I believe to be erroneous.

My attention was first drawn to capillary pressure some twenty-five years ago when I was inquiring into the principles of the cerebral circulation. I measured the pressure of the brain against the skull wall by means of a tube filled with water and closed by a thin rubber membrane, which was so screwed into a trephine hole that the rubber membrane came into contact with the bulging brain; the tube was connected with a glass tube containing an air-bubble index, and this by a T-piece with a pressure bottle and a manometer. When the tube was screwed in and the rubber membrane came in contact with the brain, the air-bubble index was pushed out from the zero pressure position. On raising the pressure bottle, so as to restore the air bubble to the zero position, the manometer recorded the pressure required to push in the bulging brain, and restore it to its natural position within the closed skull cavity. The pressure of the brain against the skull wall is due to the distension of the cerebral arterioles and capillaries by the heart, and my method, I believe, gave me a measure of the pressure in these vessels.

In the anaesthetized animal lying in the horizontal position this pressure was about 5–10 mm. Hg, and was the same as the pressure measured in the torcular Herophili; in the dog this was a bony cavity, and therefore suitable for the insertion of a tube and the measurement of the cerebral venous pressure. Trephining the lamina of the atlas and screwing in a tube there, I obtained the pressure of the cerebro-spinal fluid. I found the pressure of the cerebro-spinal fluid, cerebral venous pressure, and the pressure of the brain against the skull wall were the same and varied together, and I concluded that the cerebral capillary pressure is only some 5–10 mm. Hg, and is practically the same as the pressure in the cerebral veins; only the least difference is required to maintain the flow. I may point out here that whether blood is extravasated within the skull or we are dealing with a depressed fracture, either the blood clot or the depressed bone expresses blood out of the brain contiguous to it, and occupies the room of this blood, and so raises the circulatory pressure up to arterial pressure in adjoining parts. The clot or the bone do not continue to press, but occupy room. The increased brain pressure is due to the shutting up of the capillary-sized vessels.

The brain is enclosed within a rigid case—the skull—and the total content cannot vary, but there may be more blood in the brain and less tissue substance and cerebro-spinal fluid on the one hand, while on the other hand

* Given at St. Mary's Hospital in the Institute of Pathology and Research during the course on Pathological Research in its Relation to Medicine.

there may be less blood, and more fluid or tissue substance. The arteries may dilate and the tissue cells may swell, and these together may confine the size of the veins and raise the pressure in the capillaries, so that there is a relatively rapid flow through a more rigid set of vessels, or the arteries and the tissue cells may shrink and the veins dilate, so that there is congestion of these and a sluggish flow. In a healthy state of activity the cerebral arteries are moderately expanded, the tissue cells in a normal state of turgescence, the veins narrow, and the flow of blood and oxygenation good. In a state of collapse the opposite conditions hold: arterial pressure is low, veins congested, or there is more fluid in the spaces, and blood flow is slow and oxygenation poor.

It has commonly been taught that in the eye the aqueous fluid, which is at a pressure of some 25 mm. Hg, is filtered through the walls of the capillaries, the blood within those vessels being supposed to be at a pressure of 20 to 30 mm. Hg higher. That the pressure of the aqueous balances the capillary pressure in the iris is shown by the fact that on letting this fluid escape the iris bulges forward, and may touch the cornea, and on compressing the abdomen the vessels burst, and the blood comes into the anterior chamber. No such bulging or haemorrhage can be brought about by squeezing the belly when the eye is intact.

Martin Flack and I also showed that when one of the venae vorticae was opened, and the venous outflow from it was observed, while the pressure in the eyeball was raised by forcing normal saline into the aqueous chamber, the outflow of venous blood did not cease until the pressure in the carotid artery was just overtopped; this indicated that the capillary and venous pressures rise together and equally with the fluid pressure within the eyeball just as they do within the cerebro-spinal cavity. The contents of the eyeball are confined by unyielding membranes, and the intraocular pressure is ruled by the secretory action of the cells of the ciliary processes. Just as in the case of the brain if the cells secrete more fluid, there is less room for blood, the veins narrow and the capillary venous pressure rises. Suppose the pressure within the blood vessels rises, this increase of pressure is instantly transmitted to and balanced by the aqueous; both in the brain and the eye the pulse helps to keep up the outflow of venous blood and fluid, cerebro-spinal or aqueous.

Abrading the skin, no less than opening the eyeball or skull cavity, removes the balancing counter-pressure of the tissue fluid enclosed by resistant membranes, and allows plasma to escape through the capillaries, which are no longer supported. The tissue cells and capillary walls, too, are damaged by exposure, and the transudation of fluid thus enhanced.

While in the living kidney, confined by its capsule, the pressure of the tissue fluid and secretion balances the capillary pressure; in the dead kidney, on the other hand, water driven through the renal vessels may filter out into the pelvis of the kidney.

A sharp distinction must be drawn between the living conditions and those in a wound or in an organ of a dead animal.

In the case of a salivary gland, it is known that on stimulating the chorda tympani nerve the pressure of the saliva, when its escape is obstructed, rises greatly above that in the carotid artery. Flack and I found that the outflow from the salivary vein was not obstructed under these conditions; in fact the outflow might be rapid, while the gland became tense and swollen. There is a strong membrana propria which confines the secretory cells of each alveolus and limits its expansion, acting like the leather case of a football or the pericardium of the heart. Each lobule and lobe and the whole gland is surrounded with membranes limiting expansion. When the secretion is obstructed the alveoli swell, the lobules and lobes swell, and the whole gland swells until limited by the membranes, and the veins within the gland are narrowed while the arteries dilate owing to the influence of the vaso-dilator nerves, and the circulatory pressure is thus raised until arterioles, capillaries and veins approximate towards a rigid system at arterial pressure with a fast rate of flow.

In the sweat glands the structure is similar; the same high secretory pressure can be produced. In the kidney there are figured membranae propriae enclosing secretory cells of both renal capsules and tubules, but they are less well defined. The secretory pressure does not rise up to the arterial pressure.

Direct Measurement of Capillary Pressure.

Now let us turn to direct measurement of capillary pressure. Roy and Graham Brown used a small brass cylinder closed at one end by glass and at the other by a cup-shaped piece of transparent peritoneal membrane. A tube entered this little chamber, by means of which the pressure could be raised within it, a manometer being attached to indicate the pressure. With the peritoneal membrane in the domed-up position, the web of a frog's foot or other transparent tissues can be brought in contact so as to flatten down the dome somewhat. The web is then covered by a thick glass cover-slip attached to a holder. The chamber is placed beneath the low power objective of a microscope, and the capillary circulation observed. The pressure is then raised in the chamber so that the web is compressed between the membrane and the glass cover-slip, and the pressure is found which just obstructs the flow. In the case of man a similar apparatus inverted has been applied to the skin just behind the finger nail, and strong direct illumination used. A drop of castor oil is placed upon the finger before the application of the membrane, and the capillaries can then be seen in the papillae of the skin. Measurements of this kind have been made by a considerable number of observers, and give high values such as 20 to 40 mm. Hg.

Instead of microscopically observing the capillaries of man in the way just described, another method has been used—namely, that of finding out the pressure which just suffices to blanch a small area of the skin, as seen by the naked eye. To blanch the skin, 55 to 75 mm. Hg are required according to some observers, but the average generally given is 35 to 45 mm. Hg.

Basler has compared the colour of the compressed finger with another placed beside it, and taking the least change of colour as the index has found a much lower pressure than other observers—namely, 5 to 8 mm. Hg. He has also used a very ingenious method of making a small cut in the finger and inserting the finger in a tube connected with a manometer and finding to what pressure the escape of blood raised the manometer. Here again he finds the same low pressure. Now it is quite clear that in cutting the finger one probably would not only cut capillaries but might wound an arteriole, and the pressure might, therefore, indicate not capillary pressure, but that of the arteriole.

The arterioles in their end branches consist of endothelial cells and circularly arranged muscle cells. As they branch into capillaries the muscle cells cease, and the capillaries have an endothelial lining only. When the capillaries join together to form the venules, the endothelial lining first becomes coated with connective tissue fibrils, and then further on muscle cells are added. It seems very unlikely that there should be any great difference of pressure between the venous end and the arterial end of the capillaries. We know that the venous pressure is very small—for example, in a number of observations made by Bayliss and Starling on anaesthetized dogs while the pressure in the aorta was 81 to 125 mm. Hg, that in the vena cava was from 2 to 5 mm. Hg, and the pressure in the portal vein 5 to 8 mm. Hg. If in the upper arm the pressure is measured which just hinders the outflow from the lower, the arm being placed horizontally at heart level, it is found to be from 1 to 5 mm. Hg (L. Franks, Elpers).

The method used by Roy and Brown, and the method of blanching the skin first used by v. Kries, are methods which stop the flow of blood in the capillaries and arterioles, but obviously, if the flow of blood is stopped, the pressure rises to that within the arteries which feed these vessels. What has been measured then has not been capillary pressure but the pressure in the small arteries.

Krogh, who has made a great many observations of interest recently on the contractility of capillaries, says that mechanical excitation causes a contracted and closed capillary in the frog's tongue to dilate at the venous end first and the blood to advance from the venous end until finally the capillary dilates up to its connexion with the arteriole, when the current is suddenly reversed. Krogh finds then that the venous pressure is enough to fill the capillary, and overcome the resistance to flow within it, and the venous pressure is agreed to be only a very few millimetres of mercury.

I have examined the capillary pressure, using a modified

form of the Roy and Brown apparatus, kindly made for me by Dr. E. Schuster—

1. In the tadpole's tail.
2. In the toad's lung, tongue, mesentery, and bladder.
3. In the frog's lung, tongue, mesentery, web, bladder, and kidney.
4. In the newt's lung and mesentery.
5. In the grass snake's lung, mesentery, and kidney.
6. In the mouse's ear, mesentery, and abdominal muscular wall.
7. In the cat's mesentery and muscle.

To determine the pressure correctly the transparent membrane covering the compression chamber must be tied on loosely, as Roy and Brown direct, so that when blown up it forms a dome over which the web or other organ is spread; the threads attached to the toes in the case of the web, for example, are carried to pins, and the leg arranged so that the flow of blood is free and unobstructed. The glass against which the web is compressed is lowered until it touches the web, the top of the dome being thereby slightly flattened. The web is compressed between the flattened part of the membrane and the glass. Care must be taken to secure that the toes are not pressed by the glass cover against the metal rim of the pressure chamber, and that pressure is not spent in merely expanding the membrane.

Capillary pressure I take to be that pressure which just begins to lessen the velocity of flow in those capillaries wherein the flow is slowest. These naturally first undergo compression, the blood taking the pathway of least resistance through other capillaries. If the compression be gradually increased the flow is slowed, then stopped in more and more of the capillaries until it continues only through the most direct pathways connecting the arterioles with the venules wherein the velocity was greatest to start with. With further increased compression the flow of blood becomes pulsatile not only in the arterioles but in these capillaries and even in the venules, the compression being sufficient to stop the flow in diastole, but not in systole. Finally the blood is expressed out of the capillaries and veins, and the pulse is seen swinging the corpuscles to and fro in the arterioles, but not translating them onwards. The pressure required just to produce this effect is the systolic pressure in the arterioles supplying the compressed part.

All those phenomena which take place on the application of pressure to the arm by means of the cuff of the sphygmomanometer can thus be observed and taught to the student. The diastolic pressure can be measured in the frog's web just as well as the systolic pressure. Diastolic pressure is that which just arrests the onward flow of the corpuscles in diastole; to give an example, in a frog's web diastolic pressure was 17 mm. Hg and systolic pressure 26 mm. Hg.

The pressure required just to modify the capillary flow in the outer part of the tadpole's tail or at the edge of a frog's web is from 1 to 3 mm. Hg. There are some capillaries which require a higher pressure than this—for example, 5 to 8 mm. Hg—such as the capillaries in the papillae of the frog's tongue, or in the glomeruli of the kidney of the frog. Glomeruli may be observed with the blood corpuscles running through the afferent vessel, spinning round the network of capillaries and out by the efferent vessel—the whole giving a most striking picture. The following is the technique which was briefly described in the BRITISH MEDICAL JOURNAL of April 9th, 1921, p. 526:

The frog is put under urethane, an injection under the skin of the back of about 0.3 c.cm. of a 20 per cent. solution being given. The animal chosen is a rather small active one, not a female full of spawn. It is fixed on its side by pins through lip and ankle-joints; a lumbar incision is made through the skin and abdominal wall and the ileum on that side is removed. All haemorrhage is stopped by means of a cautery heated to a dull heat. The external edge of the kidney on which runs the renal portal vein is picked up in the forceps about the middle of the kidney and a ligature tied on at this point. The animal is then arranged belly upwards at the side of the Roy and Brown apparatus, and by a very gentle traction on the thread the kidney is drawn over the peritoneal membrane and the glass cover brought down upon it. The manipulation of the body and the traction on the thread must be so carried out as to expose the outer edge of the kidney to the light, when brought under the microscope, without stopping the circulation in the renal arteries. It is along this edge that the glomeruli may be found.

On examining the preparation the whole surface of the kidney is seen pervaded with wide venules and their capillary branches coming from the renal portal vein, through which the blood is flowing in slow and most ample streams. On putting on a pressure of 2 to 3 mm. Hg the blood is squeezed out of these veins, and glomeruli may then come clearly into view and exhibit the arterial blood coursing through them. I found a pressure of some 4 to 8 mm. Hg definitely slowed the flow in the glomeruli, while it took some 25 mm. Hg to stop the flow in the renal arteries. There is nothing extraordinary about the behaviour of the glomerular capillary network; it resembles that of other capillaries; the flow in the afferent and efferent vessels is stopped by the same pressure. I found it took very little pressure to drive the corpuscles out of the glomerulus when the circulation had stopped. I have seen the flow reverse under pressure before the glomeruli empty.

I find that a pressure of 2 to 5 mm. Hg momentarily applied checks the flow of corpuscles in the arterioles of the frog's web, etc., while it takes some 25 mm. Hg to stop the flow altogether. In the chief capillary branches, where the velocity of flow is rapid, the same pressure momentarily checks the flow, and at the same time as in the arteriole, but in the case of the venules the flow may be accelerated during and retarded momentarily after such an application of compression. The acceleration is due to the expression of blood from the capillaries, the retardation to the capillaries filling again. The pressure which momentarily checks the flow in the arteriole is, I take it, a measure of the pressure of the blood against the wall of the vessels. It closely approximates to that pressure which, when continuously applied, retards the flow in those capillaries with the slowest rate of flow. If the compression is maintained the pressure, of course, banks up behind it to that of the artery which feeds the obstructed arteriole. As the water manometer, owing to its inertia, does not fully record the value of the momentary compression, I have also used an air manometer with a xylol index, graduating this against the water manometer.

The conclusion then is reached that the pressure in the arteriole with unobstructed rapid flow is 2 to 5 mm. Hg, and that the fall of pressure from arteriole to venule is a very slight one. The flow in the venules is affected by a pressure of 1–2 mm. Hg.

The observations I have made on the mouse and cat show that the pressure in the capillaries and arterioles is no higher in the warm than in the cold-blooded animal. The assumption which has been made that the capillary pressure is some 30 mm. Hg, and the hypotheses as to the transudation of lymph, urine, etc., based on that assumption, appear then to be untenable.

Proof that the resistance in the capillaries is very slight is afforded by the following experiments: If the flow in the frog's web or tongue is stopped by a ligature placed round the thigh, we find, on exploring the field, one or more of the vessels, an arteriole, say, connecting some capillary with a venule, in which the flow continues for some minutes at a speed which is scarcely less than the normal speed in the capillaries. I have seen such a flow in the capillaries of the frog's web on placing it under the microscope forty minutes after cutting off the leg. The application of warm water to the web may restart such a flow when arrested. The flow may reverse, and this is against its being caused by contraction of the arteries. Again, when the web of the excised leg is compressed in the Roy and Brown apparatus a momentary pressure of 2 mm. Hg will cause the corpuscles to rush along the capillaries and venules no less rapidly than in the normal flow.

To try and arrive at a juster measure of the pressure in the capillaries in man my co-worker, Dr. James McQueen, designed the following method:

Warm water from a jet fed from a reservoir kept at constant pressure-head is played on the skin below the nail or on the skin covering the distal end of the metacarpal bone of the thumb, the jet having a 2 to 2.5 mm. bore diameter. If the pressure be sufficiently high, the area impinged on is rendered white, and when the jet is moved a red blush of returning blood can be seen. To determine the pressure which just suffices to produce blanching, the jet is now turned so as to throw its column of fluid into the air alongside a meter scale; the distance of the upward throw of water is obviously the pressure of impact on the thumb in centimetres of water.

When readings of pressure are taken by this method with the arm held at heart level they do not materially

differ from the readings of pressure obtained by v. Kries and others. But, be it noted, as the flow is stopped in the blanched part the readings are of arteriole not capillary pressure. Moreover, there remains to be considered the considerable resistance of the convex horny layer of skin to compression. There are also the resistance of the vascular wall to compression, the friction of the blood as it is expelled from the compressed area, the resistance of the lymph or tissue fluid surrounding the capillaries. These resistances are very small, as is shown by the fact that a pressure of 1 cm. of water applied to the membrane of the Roy and Graham Brown apparatus is sufficient to drive the corpuscles quickly along the vessels of the web wherein the circulation has been arrested. Their sum can be accurately estimated provided the blood pressure in the compressed area can be reduced to zero. Then the pressure taken to blanch the area is a measure of the resistance factors. To effect this the hand is raised above the heart level, at a certain point the veins collapse, because the venous pressure has been overtopped by gravity, and is, in the hand, zero. If the brachial artery is now occluded, the arterial pressure entering the hand is, in its turn, reduced to zero. Accordingly the capillary pressure becomes zero. A tourniquet of rubber tubing can be used, or the cuff of the sphygmomanometer connected with a compressed air cylinder so as to secure a rapid application of pressure to the artery.

In order to keep enough blood in the capillaries to give a clear index, it is advisable to put a rubber band round the wrist before elevating the arm and compressing the artery, and then to remove this band. If the jet be projected on the thumb when the area has thus been brought to zero pressure, a measure of the pressure in centimetres of water required to blanch the area is now obtained. This pressure measurement — the measurement of resistance factors—has to be subtracted from the original measurement obtained when the normal conditions of pressure pertained in the arterioles. The diminished reading is now the actual arteriole pressure. To cite an example:

Subject E.—Hand at heart level. Pressure to blanch 2.5 mm. area=35 cm. water. Resistance measurement (after vascular area reduced to zero pressure)=24 cm. water. Difference=arteriole pressure=11 cm. water. This method gave us an arteriole pressure of about 10 mm. Hg.

In the case of the bat's wing I found the main arterial branch in the second segment measured about 0.08 mm. in diameter, and the main arterioles about 0.015 mm., these coming off at right angles. When the bats are hibernating the pressure in the main branch is low, rising from some 20 mm. Hg to 50 mm. Hg as the bat becomes warm. When the systolic pressure in the main arterial branch is 50 mm. Hg that in the main arterioles is about 15 to 20 mm. Hg.

There is then a great drop of pressure on passing from the main arterial branch to the main arterioles. It is in these vessels that the great fall of arterial pressure takes place through resistance to rapid flow.

I now pass to the consideration of the contractility of the capillaries.

Effects of Arterial Contractility.

According to the general view the contractility of the arteries regulated by vasomotor nerves controls the flow of blood to each part, diverting greater streams to parts in action. But the contractility of the capillaries and venules is now an established fact, and the evidence seems to show that it has an important share in the local and general control of blood flow. Stricker (1865) noted on appropriate stimulation the constriction of the capillaries in the nictitating membrane of the frog, and ascribed it to turgescence of the endothelial cells, which form the capillaries. His observations have been confirmed by several, but no one has proved how the constriction is brought about.

The capillaries of the web dilate after the momentary touch of a brush dipped in chloroform, stasis being prevented by well washing with water. Inhibition of the heart had no effect on this dilatation, it was not brought about by blood pressure (Roy and Brown). A small drop of nicotine applied locally to the area vasculosa of the chick on the fourth day of incubation produced such dilatation that the rest of the area was almost emptied (Vulpian). Lewis and his co-workers found that in the arm, with the artery blocked by the cuff of the sphygmomanometer, a scratch on the skin with a blunt instrument produced the well-known white and red lines. In such case they must be ascribed to capillary contraction and dilatation. Local injection of adrenin also blanched the skin when the arterial flow had been stopped.

Temporary anaemia produced by ligation or compression of an artery dilates the capillaries. Almroth Wright attributes this to the production of acid through anaemia. We know that oxygen want leads to the appearance of lactic acid in muscles, and a drop of acid dilates the capillaries. On the other hand, Krogh attributes the dilatation to some unknown property of the blood, for he finds it takes place when the frog's tongue is exposed to oxygen. The capillaries are conceived by him as spontaneously contracting and dilating, and thus alternating the blood supply to the tissues, dilatation following on the anaemia produced by contraction.

Krogh finds that local mechanical, or thermal, stimulation, or the application of minute drops of weak acid, cocaine, and adrenaline produce local dilatation of both arterioles and capillaries. The effect spreads to a wider area than that stimulated. A drop of urethane (20 per cent.) dilates the capillaries and not the arterioles. The spread of the reaction due to stimulation is abolished by cocaine, and not affected by mere section of the nerves, but disappears when the nerves have degenerated, being then sharply limited to the point excited. The reactions are considered to be due to a spread of excitation along sensory nerve fibres to that antidromic vaso-dilator effect discovered by Bayliss in the posterior root axons. The contraction of capillaries may reduce their diameter by more than half and their sectional area fivefold. Dilatation occupies several seconds, contraction one to three seconds. A single stimulus is ineffectual; the galvanic current is better, and mechanical stimulus most effectual. A vast number of capillaries are at any one time not open, as may be seen by the growing flush and swelling of the hand on occluding the veins of the arm. The aching sensation which arises from congestion keeps one naturally restless, and every movement helps onward the flow.

Krogh finds an enormous increase in the number of open capillaries in muscle during activity. In the mammal he used intravenous injections of Indian ink to render the capillaries visible. He estimated that in the guinea-pig the total surface area of the capillaries per cubic centimetre of muscle was 3 to 32 sq. cm. at rest and 360 to 750 in activity; in the frog 1 to 12 sq. cm. at rest and 70 when active. The oxygen supply to the active muscle is thus kept ample.

I find a very instructive preparation of the abdominal muscular wall of the mouse (under urethane) can be made by an incision through the median line of the lower half of the abdomen and another carried laterally outwards from the mid-point, the skin being reflected, the triangular flap of muscles with the blood vessels entering from below is brought on to the membrane of the Roy and Brown apparatus. In such preparations all the capillaries appear filled, perhaps owing to exposure or to the fact that the muscle is always in respiratory action.

Venous Contractility.

In the hibernating bat's wing most of the capillaries are empty, and the veins contract in such period as to help the feeble flow. There may be, and probably are, contractions of all veins which further flow. We know that muscular contractions and change of posture greatly contribute to return of the venous blood to the heart. Thus Burton Opitz on stimulation of the sciatic nerve found the outflow from the femoral increased three to four times above the resting value during the shortening of the muscles, but it was diminished to about a third during the height of tetanus.

Hooker isolated the sigmoidal area of the large gut of the dog, and leaving the artery open connected the vein with a manometer. Excitation of the nerve supply from the inferior mesenteric ganglia increased the venous pressure by 5 mm. Hg, asphyxia increased it by 3½ mm. Hg. Although the lumen of the gut did not show this rise of pressure when closed and connected to a manometer, I believe that the contraction of the tissues caused the rise.

Hooker also finds that after death from ether, the capillaries first contract and empty, then dilate and fill, and finally contract and empty when rigor comes on. This does not happen in the cat in a state of shock—for example, in one poisoned by histamine.

The arteries of the ear in such a cat contract on stimulation of the nerves or on injecting adrenin, but not the dilated veins and capillaries.

Shock.

The work of Dale and his co-workers indicates that shock produced by histamine has its origin in primary failure of the peripheral circulation. All the capillaries open and venules dilate at once, and there is increased passage of fluid from the blood into the tissues, and so the circulation fails while the heart is beating efficiently. While Dale injected histamine, I watched the venules dilate in the mesentery and the flow slow down and almost become arrested in these and in the capillaries, but have not so far been able to see the opening up of closed capillaries, probably because the capillaries are already dilated by exposure. Histamine is formed by decarboxylization of the amino-acid histidine, which is derived from proteins, and it is conceivable that such substances are produced in trauma. Herein we have an explanation of shock differing from that of acid causation put forward by Almroth Wright.

Be it noted, histamine acts in the cat anaesthetized by ether, but not in the normal cat or one anaesthetized by nitrous oxide and oxygen. The last is by far the best anaesthetic for preventing shock, and as P. Bert proved forty years ago, and Dale and I have confirmed recently, may be given with ease and safety and efficiency of depth in a pressure chamber at + 7 lb. pressure. An operating chamber can easily be constructed so that the patient, surgeon, and anaesthetist are all within the chamber at slightly increased atmospheric pressure. The effect of inhaling gas and oxygen, given in the usual way from a bag in such a chamber, is an increase of partial pressure, or concentration, of both in the blood, and deep anaesthesia with no want of oxygen.

Effects of Oxygen Inhalation.

The beneficial action of oxygen inhalation in relieving oedema and chronic ulcers has recently been made evident to me by the use of an oxygen tent bed, constructed for me by Messrs. Siebe, Gorman, Ltd. This tent bed allows 30 to 40 per cent. oxygen to be breathed in comfort for days, with intermissions for meals. The oedema disappears, the part becomes warm and of good colour, the granulations healthy, the edges of the ulcer flatten, and the skin hastens to spread over the ulcer.

The question arises as to how the capillaries contract and dilate. It is generally assumed, but unproven, that it is due to changes in the swelling of the endothelial cells of the capillary wall. I suggest that it is due to the tissue cells outside the capillaries; these, by swelling or shrinking, control their own blood supply. By increase of waste products with higher osmotic pressure they take up fluid from the blood in the capillaries and swell, and so contract the capillaries. By chemical-physical changes resulting from the taking up of fluid from the blood the osmotic pressure falls, and the fluid passes back into the blood or lymphatic channels.

I have pointed out what happens in the salivary gland on excitation of the chorda tympani, and how the membranae propriae and other membranes confine tissue expansion so that the capillaries and veins may be narrowed but not occluded. I do not believe fluid is transuded out by the force of the heart producing a filtering pressure, but that the heart just succeeds in maintaining a flow in the capillaries with no excess of pressure for other purposes, and the tissues by inhibition swell or shrink, taking or giving up fluid.

Charles Bolton, narrowing the inferior vena cava to one-third by a rubber ring, has shown that oedema results in dogs, not when the temporary small rise of venous pressure occurs at first, but later, when the venous pressure has returned to normal. Oedema is due to ill nutrition of the tissues, not to increased vascular pressure and filtration, whether it arise from poor flow and want of oxygen in heart disease or from a chemical poison in kidney disease, or from a bacterial toxin.

The swelling of the tissues in oedema, by pressing upon the venules, raises the capillary pressure.

I have measured the pressure in a case of hydrocephalus with the infant lying horizontal. It was nearly 15 mm. Hg. On raising the head from the pillow the pressure rose owing to my hands squeezing the head which was a bag of fluid. The capillary venous pressure in the pial vessels must have risen *pari passu*, there is no mechanism for shielding them from the pressure of the fluid. I moreover found, on drawing off the fluid, that the pressure sank to 0—that is, to atmospheric pressure — and the soft wall of the skull by its weight sagged in. So it remained for hours, until the fluid was re-secreted.

In a case of oedema of the leg, with the patient sitting propped up, the pressure of the fluid equalled about 40 mm. Hg; here again the pressure rose on lifting the leg up, owing to squeezing by the hands, and the capillary venous pressure must have risen *pari passu*, and kept as it is normally, the least bit above the tissue fluid pressure, so as to maintain the venous outflow.

In inflammation the products of tissues damaged by bacterial toxins cause dilatation of arteries and swelling of tissues. The swollen tissues, confined by the membranes, press upon and narrow the veins and capillaries. The blood pressure rises, and we have a more rigid system with fast flow, redness, swelling, and a throbbing pulse in the part. The tissues may swell so that stasis is produced; the surgeon's knife then relieves the swollen, tense condition, and allows lymph with its immunizing powers to escape. Bier's bandages obstructing venous flow may cause increased outflow of lymph, not by transudation under pressure, for capillary pressure is balanced by tissue fluid pressure, but by increased imbibition of tissue cells due to oxygen want. The salt solution treatment of wounds devised by Almroth Wright pulls fluid out in increased amount, and washes the wounds just as the breathing of cool air, with its low water vapour content, by evaporating moisture from the respiratory membrane, draws abundant lymph from the blood and keeps this clean and healthy.

Krogh finds that, after putting in a drop of 20 per cent. urethane on the capillary field and injecting neutral red intravenously, the dye passes through the dilated capillaries and stains the bordering tissue, the stain fading away from the capillary. This he ascribes to increased permeability. It may equally well be due to increased force of inhibition exerted by the damaged tissue cells. The escape of white blood cells during stasis and of red cells on severe injury shows a pathological permeation of the capillary wall; but normally the tissue cell, not the capillary pressure, governs the passage of fluid.

References to literature are fully given by Tigerstedt, *Ergebnisse der Physiol.*, 1920, 18, and Hooker, *Amer. Physiol. Review*, 1921, 1, Part I. See also Krogh, *Journ. Physiol.*, 1920, 53, 26; Leonard Hill, Proc. Physiol. Soc., *Journ. Physiol.*, 1920-21, 54; Leonard Hill and J. McQueen, *Brit. Journ. Exper. Path.*, 1921, 2, 1.

DUAL RADIOTHERAPY IN MALIGNANT DISEASE.

BY

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X RAYS and radium are undoubtedly powerful therapeutic agents. But, since the technique required to obtain their complete beneficial results has not as yet been mastered, we are at present unable to make full use of them. Consequently most of our failures must be attributed to the uncertainty of our technique rather than to the agents themselves.

Physicists have given us much help in solving some of the problems connected with *x* rays and radium. But until they can give us not only an accurate means of measuring dosage to pathological cells lying below the surface of the skin, but also indications of the conditions and dose required to produce a full lethal effect on these cells, our results are bound to be erratic. At present results depend partly on luck—that is to say, on whether the particular dose administered happens to be the most effective one—and partly on the practical experience of the radiologist, which enables him to gauge this with a certain amount of accuracy. It should, indeed, be possible to administer *x* rays and radium radiations as accurately as drugs. It should equally be possible to have some idea of the prescription required for the case in hand.

There are, perhaps, no therapeutic agents affecting such a variety of diseases, or from which more remarkable

results can be obtained in many cases otherwise hopeless. The work carried out by the *x*-ray treatment department of the London Hospital in the course of the last ten years bears out this statement. Over 11,000 new cases have been treated, averaging 5,000 attendances a year. This total includes 115 different diseases, ranging from deep-seated and malignant tumours to conditions so superficial as warts and corns. It is clear that control of dosage is essential in the treatment of such widely separated diseases.

Out of the total given above, 1,500 were cases of mammary carcinoma, some requiring prophylactic treatment, others being recurrent or inoperable. Carcinoma of the breast being the largest class of cancer cases, I endeavoured to find out and classify the results of *x*-ray treatment in the hope of improving our methods. The tracing of hospital patients was impracticable. Statistics are apt to be deceptive. But in the case of patients who were traced, metastases in the thorax accounted for a large percentage of deaths, although the superficial recurrences had been controlled. Was it not possible to control these deep metastases in the same way as the superficial? Clearly, any successful method must fulfil two conditions: (1) It should be possible to administer a dose lethal to pathological cells lying at various depths and in unknown positions; (2) the radiated area should be large. The importance of the second factor is emphasized in a valuable paper on the "The Spread of Breast Cancer," by W. Sampson Handley, in the *Archives of Radiology and Electrotherapy* (October, 1920).

In the hope of fulfilling these two conditions, I devised the dual method of radiotherapy which has been installed in temporary quarters at the London Hospital. Although designed for the treatment of carcinoma of the breast and thoracic tumours, it can be used for many deep-seated conditions, such as abdominal tumours, splenic cases, and it may, I believe, prove of some value in the treatment of pulmonary tuberculosis.

Rationale of Treatment.

The complex question of dosage cannot be discussed here, but I have for some years based my deep therapy on the following principles: (1) Full cell absorption; (2) production of a large number of heterogeneous rays; (3) a filter only thick enough to protect the skin and to cut out rays of little or no therapeutic value. These were suggested by facts supplied by physicists and by gleanings from my personal experience. Although I cannot here go into further details, the results in the more superficial conditions have been up to the present so satisfactory that an elaboration on the same lines, such as with the dual method, seemed justified. Any new scheme for deep therapy should be founded on a logical basis. It must be admitted that our knowledge of the actual influence of *x* rays on the living cells is meagre; but I think it is sufficient to indicate the lines that should be followed, even though these may have to be altered as our knowledge increases. I do not think the full therapeutic value will be obtained by endeavouring to produce *x* rays with the penetration of radium at the expense of maximum cell absorption. I suggest that there is some unknown factor in radium radiations which, apart from their high degree of penetration, may account for their therapeutic effect. The reports of the Radium Institute show that the therapeutic results of radium radiations are equal to those of *x* rays properly administered, their chief value being in cases where the disease is inaccessible to the latter, whilst their disadvantage lies in the limited field of radiation.

Technique.

The shortcomings of our present methods are these:

1. The dose administered to the deep-seated and scattered pathological cells is too small.
2. The area treated is much too limited.

The dual method for deep therapy, of which I have found no mention in the literature, consists of two separate installations, of which one operates a tube in front, the other a tube at the back of the patient, who is in the sitting position, both tubes running simultaneously. After the first full dose has been administered the direction is changed, so that the radiation is now from side to side, the arms being forward and raised. In this way the deepest parts of the body are subjected to radiations from the four points of the compass, and the resulting cell absorption must be very much greater than with our present methods, although the more superficial, or skin dose, controlling superficial recurrences, remains the same.

By this method, which may be described as a combined cross-fire, the deficiencies of current methods, referred to above, are avoided; that is to say, (1) by working both tubes at the same time from both sides of the body a larger dose is administered to the deeper pathological cells; (2) a very large area is covered.

It is doubtful whether any additional therapeutic effect is to be expected from the coincidence of the rays in the deeper tissues. At any rate, malignant cells in the tissues, lymph channels or blood stream, must certainly come under the influence of the radiations.

The radiation of a large area did not present much difficulty. It merely entailed the manufacture of a protective shield or tube-box with a large opening. I prefer a lead glass shield, but as I was unable to obtain one with an opening large enough for my purpose, I utilized the standard one reversed—that is to say, the smaller opening, blocked by protective material, not only holds the shield in position, but admits the air-blast, directing it to the back of the tube. The larger aperture now faces the patient, giving a very large radiation field, including, at a reasonable distance, practically the whole trunk, axillae and supraclavicular fossae.

I consider it important that the maximum dose the patient can tolerate should be administered at the first and at every subsequent sitting. If this is not done, there is a possibility of the pathological cells being encouraged or stimulated to assume defensive measures against the destructive effect of the radiations. We all know that some kind of acquired immunity, not to be confused with stimulation, may occur. Cases that respond well at first may quite suddenly cease to do so if the treatment is prolonged and the dosage too light.

To put it briefly therefore: "Always hit hard; do not continue treatment once you have achieved your object."

Blood counts are at present carried out in all patients immediately before and after exposure, and at varying intervals subsequently, with a view to ascertaining the maximum dose they can tolerate. But, when once this is established, these frequent blood counts will probably be unnecessary—at any rate in cases of mammary carcinoma. In all cases of cancer the thorax is carefully examined radiologically before treatment, and a plate taken as a record.

We cannot as yet decide definitely how frequent the treatment should be; this must, to a certain extent, depend on the blood changes and other symptoms, the significance of which is still debatable. At first, patients were treated once a week, receiving 20 X skin dose through 3 mm. of aluminium at each of the four areas—the front, back and two sides, giving a total of 80 X at each sitting. Six of these would have completed the first series of 480 X, but it was found that only a few patients could tolerate the full 80 X dose. The occurrence of nausea and vomiting within a few hours of treatment (sometimes lasting as long as three days) demonstrates, I think, the fact that tolerance to *x* rays has been reached and is limited in different patients. I believe, however, that by working up to the maximum gradually, secondary symptoms may be avoided. These after-effects may not necessarily be the results of *x* rays; ozone and nitrous fumes may cause the sickness. The whole matter is being investigated.

Treatment is now administered weekly: anteriorly and posteriorly the first week, the second week from both sides, the total dose being 40 X through 3 mm. of aluminium in each week. Although many tolerate it, there are some who cannot stand even this dose.

DOSAGE.

Registration of Dosage.

Accurate measurement of the dose absorbed by the pathological cells composing even a single tumour is practically impossible. At present only a very rough calculation can be made, and even this is dependent on several unknown factors. The difficulty is still greater when we are endeavouring to irradiate a number of cells scattered about in the body at unknown depths and in unknown positions. The best we can do is to measure the maximum

skin dose under certain known conditions and give as large a dose of heterogeneous rays as possible. The calculation of the skin dose used in the treatment of tinea is simple and accurate, but difficulties arise when a filter is inserted. We have the Sabouraud pastille, the Kienböck strip, the Holzknecht strip, and many others by which the dose can be gauged, but most of these are intended for use without a filter. We are waiting for a simple practical unit for filtered rays.

For want of a better I have, for many years, used the Sabouraud pastille on the skin as my unit, Kienböck's strip not being very practical, as an overdose or underdose may easily be given, usually too late to remedy the error. The time factor with a Coolidge tube is fairly accurate, but even here each tube must be tested periodically by some method or other. It is better to take the reading on the skin itself, as the distance of the tube and the thickness of the filter can then be practically disregarded, although this process involves the establishment of a new unit. The main difficulty when using a Sabouraud pastille on the skin is the reading of the slight tint alteration that takes place, but this may be overcome by the use of a tintometer.

I have found from experience that the effect on the skin of an erythema dose through a filter was not the same as without a filter, a fact which, I believe, agrees with the expectations of physicists. Realizing this, would it be possible to fix a unit which would give us the danger dose through a filter? The method I adopted some years ago to gauge roughly the maximum skin dose with a filter, when treating deep-seated tumours, is as follows: A Sabouraud pastille is placed on the skin; when this registers a quarter B tint the skin has received a 10 X dose, irrespective of the distance of the tube or of the thickness of the filter. This was taken as the minimum dose, not as the erythema dose, the maximum which I have applied being a 20 X dose, again measured on the skin through 3 mm. of aluminium. The pastille in this case will read ¼ B tint. The ¼ B tint and the ½ B dose must not be confused; they are entirely different. Penetration should not be below 9.5 Wehnelt. Caution is required by the operator in using these large doses; they should be worked up to gradually. The margin of error being small, a certain amount of proficiency in the use of the apparatus and in the reading of the pastille changes is essential.

I have given this 20 X dose through 3 mm. of aluminium as often as twice a week in desperate cases with no resulting skin changes beyond deep pigmentation. Such possibilities as late reactions must be risked when the patient's life is at stake.

Possible Dangers.

1. *Blood.*—Massive doses are said to lead to definite blood changes, the details of which cannot be gone into here. With the dual radiotherapy, not only is the total dose large owing to the extensive area of the body subjected to radiations, but the heart, when thoracic conditions are being treated, is being radiated from all sides. I believe, however, that any blood changes that occur are caused by the direct action of the rays on the blood-making tissues, such as the spleen and bone marrow, rather than on the blood corpuscles. So far no blood changes have been found.

2. *Intestines.*—Various organs are said to be influenced by radiations, amongst them the intestines. As the dual method has not yet been applied to abdominal cases this point cannot be settled. A careful watch should be kept on all patients under treatment for indications of possible damage to organs in the field of radiation. Any undesirable effect should be rectified by modification of dosage and frequency of treatment.

Results.

The first patient was treated by the dual method only on February 24th, 1921, and some time must therefore elapse before any reliable data can be expected where an effort is being made to prevent metastases, but in those cases in which the primary lesion has been treated, such as an intrathoracic growth they appear to respond very much more rapidly than with the localized method used previously.

It must always be remembered that the time is possibly approaching when the cure may prove worse than the disease. In our efforts to destroy malignant cells we may destroy far more than we intended.

The *secondary phenomena* so far noted are of some interest. Few can tolerate the full 80 X dose, nausea and vomiting, lasting from several hours to three days, appearing shortly after treatment. If, however, the dose is halved—two opposite areas only being treated instead of four—the patients may experience a feeling of well-being, which one patient aptly compared to the effect of a glass of champagne. In one case, that of a large intrathoracic growth (the patient was a doctor), the secondary symptoms—nausea and vomiting—were very marked after even the first 40 X dose, yet others experienced no ill effects whatever, even after the full 80 X dose. These secondary phenomena are somewhat puzzling and are being investigated, as other causes besides the direct action of *x* rays may be responsible.

I have given but a rough description of the method, hoping that others may work on the same lines, and that at some future time interesting comparisons and conclusions may be made.

Radiologists appear to have divided themselves into two schools—those who endeavour to attain *maximum cell absorption* and those who pin their faith on *excessive penetration* at the expense of absorption. The dual method follows the cell absorption line of technique.

FURTHER REPORT ON THE TREATMENT OF SLEEPING SICKNESS.

BY

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In a previous report published in the BRITISH MEDICAL JOURNAL of May 22nd, 1920, p. 702, by one of us (C. H. M.), attention was drawn to the treatment of sleeping sickness by combined intravenous and intrathecal injections of organic arsenical preparations (neo-kharsivan). An epitome of twelve cases thus treated was also given.

Since then the number of cases treated and under observation has increased to over 50, and the conclusions we have drawn are that this treatment shows prospects of a possible cure for, at any rate, early cases of this protean disease.

The following is a summary of the technique of the treatment, given in detail in the report previously alluded to:

An intravenous injection of an organic compound of arsenic is given, and after a period varying from one to four hours a certain quantity of blood—usually 20 c.cm.—is withdrawn. This is kept in a vessel, stood in cold water, until the serum separates completely from the formed elements of the blood. The separated serum is then injected into the cerebro-spinal cavity, an equal amount of cerebro-spinal fluid having been previously drawn off. This completes the treatment, and the patient is free to resume his normal life, subject to his reporting from time to time for re-examinations.

The principle of the treatment was based on the theory that the trypanosomes having once reached the cerebro-spinal canal were, after a certain time, immune to any medication via the blood stream; since we have adopted this routine procedure for sleeping sickness cases we have had striking examples of this fact.

The following are examples:

Case 30.

Karungaho, a man with large typical chains in the neck, admitted to hospital on June 14th, 1920. Gland puncture showed numerous trypanosomes and filariae. On June 15th, 0.6 gram neo-kharsivan was injected intravenously; on the 17th 12 c.cm. of cerebro-spinal fluid were drawn off by lumbar puncture. The cerebro-spinal fluid on examination showed trypanosomes.

Case 33.

Wana, a man with large typical glands, was admitted on June 19th, 1920, gland puncture showed trypanosome infection. Neo-kharsivan 0.6 gram was administered intravenously on June 20th, and on the 23rd when 12 c.cm. of cerebro-spinal fluid were drawn off, prior to intrathecal medication, it was found to contain living trypanosomes.

The next case is, to our mind, more striking, and we think proves conclusively our theory.

Case 34.

Asumani, a boy with typical enlarged glands on both sides of the neck from which trypanosomes could easily be recovered, was admitted on August 3rd, 1920. On August 5th he received 0.6 gram of neo-kharsivan, and as his home was far away he was kept in hospital. He was given no intraspinal treatment. Towards the end of October this boy reported difficulty in walking and general debility; on examination of his cerebro-spinal fluid living trypanosomes were found, while none were discoverable in the blood or in his cervical glands. His glands were again examined at the time of writing this report (December 24th, 1920), and still nothing could be found.

(It should be noted that in none of the above cases was there any chance of reinfection.)

While there is no doubt that in healthy individuals drugs administered intravenously may find their way into the cerebro-spinal fluid,[1] we are of opinion that the choroid plexus mainly and other structures concerned in the diffusion of the plasma and the cerebro-spinal fluid, become obliterated at a clinically early stage; the result is we have two foci of disease—the blood or lymphatic stream and the cerebro-spinal cavity—and to get rid of the disease it is necessary to attend to both these foci. That the permeability of the meninges is seriously affected at an early stage of the trypanosome infection is evidenced in the living by early lymphocytosis of the cerebro-spinal fluid, and in the dead by microscopical examination of the meninges, the latter being at times the only evidence of the disease; and when such nervous alterations have occurred, blood medication, however active, will fail to influence the course of the disease.

Many authorities are agreed that the administration of a dose of salvarsan, neo-salvarsan, or atoxyl is sufficient to sterilize the blood in a surprisingly short time; the patient is thus looked upon as temporarily cured, but within a variable period of time nervous symptoms appear, and the infection goes on unchecked, the patient eventually dying. Excluding reinfections, two theories have been put forward to account for this: (*a*) That there are resistant forms, and (*b*) that certain trypanosomes are protected from the action of the medicament by their position in the organism, for example, bone marrow, central nervous system.[2] While the possibility of the trypanosome in forming new races cannot be doubted, and is by some considered as unlimited,[3] we are more inclined to think that the second theory is the more probable, from the arguments we have set forth.

It also appears very probable to us that, if we can obtain a case of trypanosomiasis in its early stages, one single dose of salvarsan or any other allied drug may be enough to cure once for all the patient from the infection, and this may account for those cases which have been recorded as cured, and in this category we are inclined to place two of our own cases (Case 14 and Case 28), who only received an intravenous injection, and who, up to now, are enjoying excellent health. These cases were originally kept as controls, and that is why they had no salvarsanized serum given them.

The detection of early cases is a difficult affair, except perhaps in Europeans where a history of having been bitten by a fly in a glossina-infested area, may be obtainable. Even then the assertion that the case is an early one is distinctly risky, as one cannot be sure of the presence or otherwise of the trypanosome in the cerebro-spinal fluid unless the latter is examined, and once this has been decided upon, as it should be, the salvarsanized serum can be given at the same time.

An injection into the theeal cavity, done with the usual antiseptic precautions, does not show any untoward symptoms or sequelae; we have noticed that the injection of salvarsanized serum is usually accompanied with a slight rise of temperature to 100° or 101° F., pains in the back along the spinal column—most marked in the region of the anus—vomiting, and slight diarrhoea. These symptoms disappear in a day or two, after which time the patient is discharged.

The course, therefore, of the trypanosome in the human body is, first, its passage into the blood, subsequently followed by glandular enlargement, usually in the cervical region; secondly, its passage into the central nervous system, where soon it produces lesions of the meninges, which shut it off from its parent in the blood. The curability or otherwise of the disease, therefore, depends to a great extent on how far the nervous lesions have advanced; if these are far advanced the infection ceases, so to say, to be trypanosomiasis and becomes a chronic nervous disease, ending in death. There seems to be, though, an appreciable period of time between the passage of the trypanosomes in the cerebro-spinal fluid and the onset of nervous symptoms, and it is possible, we think, to greatly improve, and perhaps cure, the patient during this time; it is only when irremediable and irreparable damage has been done to the central nervous system that the case is hopeless.

From an analysis of cases thus treated (from those we exclude those which have been done during the last three months) it appears that the patients after the treatment start putting on weight, feel much better and are generally changed individuals. They are able to do physical work, not excluding porters' work, which, we might add, consists in the carrying of loads varying between 40 and 50 lb. for an average distance of about ten or fifteen miles. Another patient of ours, treated in April (Case 23), aged about 60, cycled in about thirty miles one morning for re-examination—a feat for him, as he stated he had been unable to ride a bicycle for at least a year before treatment.

Analysis of Cases of Sleeping Sickness treated with Neo-kharsivan, Atoxyl, or Plain Serum.

N=Neo-kharsivan; A=Atoxyl; S=Plain Serum.

Case No.	Sex.	Date of Treatment.	Drug.	No. of Re-examinations, with Date of Latest.	State of		
					Blood.	Glands.	C.S.F.
		1918.		1919.			
1	M.	Sept. 26	N	1; Jan. 11			
				1920.			
2	F.	Sept. 30	N	5; Oct. 29	Neg.	None	Neg.
3	M	Oct. 1	N	—	—	—	—
		1919.					
4	F.	Jan. 9	N	4; June 28	Neg.	None	Neg.
5	F.	July 11	N	1; Oct. 26	—	—	—
6	Dog	—	—	—	—	—	—
7	M.	June 1	N	5; Oct. 26	Neg.	None	Neg.
8	M.	Sept.	N	3; Nov 28	Neg.	None	Neg.
9	M.	Sept. 26	N	1; Nov. 3	—	—	—
10	M.	Oct. 25	N	—	—	—	—
11	M.	Nov. 27	N	3; Oct. 23	Neg.	None	Neg.
12	M.	Nov. 27	N	3; Oct. 23	Neg.	None	Neg.
13	F.	Nov. 29	N	3; Nov. 3	Neg.	None	Neg.
14	M.	Nov. 29	N	3; Oct. 26	Neg.	1 gland; 2 punctures; Neg.	Neg.
15	M.	Dec. 2	N	3; Nov. 3	Neg.	None	Neg.
		1920.					
16	M.	April 26	N	2; Oct. 26	Neg.	None	Neg.
17	M.	April 26	N	2; Oct. 26	Neg.	None	Neg.
18	F.	April 26	N	2; Oct. 28	Neg.	None	Neg.
19	F.	April 25	N	2; Nov. 3	Neg.	None	Neg.
20	M.	April 26	N	—	—	—	—
21	M.	April 27	N	—	—	—	—
22	F.	April 27	N	1; Nov. 3	Neg.	None	Neg.
23	M.	April 28	A	2; Oct. 26	Neg.	None	Neg.
24	M.	April 28	A	1; Nov. 3	Neg.	None	Neg.
25	M.	April 23	A	2; Oct. 26	Neg.	None	Neg.
26	M.	May 3	A	2; Oct. 26	Neg.	None	Neg.
27	M.	May 4	A	1; Oct. 26	Neg.	None	Neg.
28	M.	May 8	N	1; Nov. 3	Neg.	None	Neg.
29	M.	May 13	N	1; Nov. 3	Neg.	None	Neg.
30	M.	June 15	N	1; Nov. 3	Neg.	None	Neg.
31	M.	June 15	S	1; Nov. 3	Neg.	None	Neg.
32	F.	June 18	N	1; Nov. 3	Neg.	None	Neg.
33	M.	June 20	N	—	—	—	—
Under six months.							
34	M.	Sept. 5	S				
35	M.	Sept. 13	S	No re-examinations to date.			
36	M.	Sept. 14	N				
37	M.	Aug. 28	N				
38	M.	Aug. 27	N				
39	M.	Aug. 27	N				
40	M.	Oct. 4	A				
41	M.	Oct. 5	A				
42	M.	Oct. 6	A				
43	M.	—	—	—	—	—	—
44	F.	Oct. 4	N	No re-examinations to date.			
45	M.	Sept. 29	S				
46	M.	Sept. 24	N				
47	M.	Nov. 15	A				
48	M.	Nov. 15	A				
49	M.	Nov. 15	A				
50	M.	Dec. 2	A				
51	M.	Dec. 2	A				
52	M.	Dec. 6	A				
53	M.	Dec. 6	A				
54	M.	Dec. 6	A				
55	M.	Dec. 6	A				
56	M.	Dec. 28	N				

Notes.—Case 1 died of sleeping sickness. Case 3 (the date of whose treatment is uncertain) disappeared; presumably dead. There are no records of Cases 5 and 9; ? died of sleeping sickness. Case 6 (dog) was shot. Case 10 died of sleeping sickness. Case 33 died (?CHCl$_3$ poisoning). Case 34 is under treatment; referred to in report. Case 42 died of pneumonia, October 25th, 1920. Case 43 died one day after admission; no treatment given. Case 46 was a European.

Duration of Cases up to December 31st, 1920, without any Symptoms or Microscopical Findings.

Case 2	...	27 months
,, 4	Av. 24	,,
,, 7	Av. 18	,,
,, 8	Av. 15	,,
,, 9	Av. 15	,,
,, 10	14	,,
Cases 11 to 15	13	,,
,, 16 to 25	8	,,
,, 26 to 29	7	,,
,, 30 to 33	6	,,

Cases in which the Cerebro-spinal Fluid was Positive.

Case 7.
,, 10 (since dead of sleeping sickness).
,, 30.
,, 33 (since dead).
Case 39.
,, 42 (since dead).
,, 44.
,, 45.

Deaths and Causes.

Case 1 ... Sleeping sickness.
,, 3 ... Disappeared; presumably dead.
,, 5 ... ? Sleeping sickness (no records).
,, 9 ... Sleeping sickness.
,, 10 ... Sleeping sickness.
,, 33 ... ? Delayed $CHCl_3$ poisoning; marked mediastinal changes at necropsy.
,, 42 ... Pneumonia.
,, 43 ... Died on admission.

While it may be early to state positively that the present treatment promotes definite cure, we cannot help but feel optimistic in the face of the results we have obtained. Several of our cases have gone well beyond a year with one dose of treatment, and they have all invariably improved in health and no trypanosomes have been found, though they have been subjected to repeated and careful investigations.

Most of our cases have been treated with Burroughs Wellcome and Co.'s neo-kharsivan, a few cases were also treated by atoxyl, the object being to find out which is the more efficient drug. We also mean to use other drugs such as galyl and also tartar emetic, and we hope to be able to publish during the next year (1921) comparative results of the various drugs used.

Experiments are also being made to see whether the results we have up to now obtained may not be due to the formation of trypanolysins or other antibodies. That the trypanosomes give rise to specific lysins was suggested by Louis Martin and Henri Darre, who attributed the fever to the massive destruction of the parasites by trypanolysis, and who showed that the blood of patients obtained at the onset of fever had a very marked trypanolytic power both *in vitro* and *in vivo*. We have therefore treated one or two well chosen cases with plain serum—that is, the serum from one of our treated cases was injected into the blood and cerebro-spinal fluid of another sleeping sickness patient; up to now it is much too early to form any opinion.

Conclusions.

1. Of 56 cases treated up to now, 8 are dead. Of 6 of these we have records, and of these 6 only 3 died of sleeping sickness, the others dying of an intercurrent disease, favoured, may be, by the trypanosome infection.

2. All the remaining cases are doing well, some (21) have only been treated during the last six months and so are excluded from this paper, though included in the index of cases.

3. The drugs tried so far have been neo-kharsivan most extensively, and to a less extent atoxyl, but all that has been said in this paper refers mainly to neo-kharsivan.

4. Plain serum treatment is also being tried in a few carefully selected cases. In advanced cases we are trying direct spinal medication; so far the results are uncertain—one case treated thus died; another, under observation, in whose spinal cord 0.003 gram neo-kharsivan was introduced, seems to present a certain amount of improvement.

Finally, we wish to express our thanks to Dr. C. A. Wiggins, Principal Medical Officer of this Protectorate, for his assistance and encouragement in carrying out these investigations and for his permission to publish this report.

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THE VIRULENCE OF DIPHTHERIA-LIKE ORGANISMS.

*A NOTE ON THE INTRACUTANEOUS TEST.**

BY

A. J. EAGLETON, M.D.LOND.,

AND

E. M. BAXTER, M.SC.SHEFFIELD.

FOR testing the virulence of diphtheria-like organisms, Zingher and Soletsky[1] described a method of intracutaneous injection which was a modification of that originally described by Neisser. They advocated the method on the grounds of economy, and stated that in 60 cases it gave the same result as the subcutaneous method. These authors usually tested four strains on each pair of guinea-pigs.

We have been using a similar test for some months, and are submitting our experience of it in the hope that it may prove useful to the many public health pathologists in England who are working in the same field. The modifications we have introduced are as follows:

1. Standardization of inoculum by opacity.
2. Inclusion of a known virulent strain in each test.
3. Injection of control animal on the preceding day.
4. Administration to the unprotected animal of a "following dose" of antitoxin of such a size that the skin reactions are not obscured while the life of the guinea-pig is saved.

The technique of the test is as follows:

Two guinea-pigs are used for each test; both must be partially white.

Protecting Dose.—One animal is given 500 units of diphtheria antitoxin by intraperitoneal injection on the day preceding the test. This animal acts as a control.

Preparation of Inoculum.—The test strains and a known virulent diphtheria bacillus are grown eighteen hours on Loeffler slopes, emulsified in saline, diluted and standardized by opacity so that the suspension contains approximately fifty million organisms per cubic centimetre.

Injection of Suspensions.—White-haired portions of the guinea-pigs are depilated with calcium sulphide paste, and into corresponding skin areas of the two animals is injected 0.2 c.cm. of each suspension. The injections are strictly intradermal and at least half an inch apart. On each pair of animals we usually test eight or ten strains, including the control virulent.

Following Dose.—Four or five hours later the animal which was not given a protecting dose on the previous day receives 125 units of diphtheria antitoxin intraperitoneally.

Readings are taken for the next three days.

In the case of a virulent diphtheria bacillus the control animal shows nothing or a faint transient flush; the other animal shows a definite rose-red swelling which becomes more marked at each successive reading, and may terminate in slight necrosis. An avirulent diphtheria-like organism gives a negative result with both animals. If the test culture is contaminated with streptococci the result may be obscured by a reaction in both animals, but this does not always happen.

The advantages of the test are:

1. Economy of animals, as both survive.
2. Owing to the variability of growth shown by different strains, standardization by opacity is preferable to the use of a certain proportion of a slope culture (as in the American method).
3. Reliability. We have had the opportunity of comparing only a limited number of strains by the subcutaneous injection method; so far the agreement is satisfactory.

REFERENCE.

[1] Zingher and Soletsky: *Journal of Infectious Diseases*, vol. xvii, No. 3, 1915.

* From the Wellcome Physiological Research Laboratories.

MUCH is hoped in Germany from the regulation, made at the beginning of 1921, prohibiting the exploitation of Wassermann's test by persons unrecognized by the health authorities as competent to carry it out. A further precaution to secure a reliable Wassermann test is the decree that only those extracts must be used which have been tested at the Institute for Experimental Therapy, conducted by Professor Kolle at Frankfurt a. Maine.

THE LINGUAL APPLICATION OF IODINE AS A PROPHYLACTIC IN CEREBRO-SPINAL MENINGITIS AND INFLUENZA.

BY

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SENIOR MEDICAL OFFICER, UGANDA PROTECTORATE.

THE treatment of cerebro-spinal meningitis by the application of iodine to the tongue led me to try it also in this manner as a prophylactic for the same disease, and for influenza during the epidemic in the Mbarara and Kigezi districts, Uganda, in 1918–19.

In both diseases the site of infection appears to be the respiratory passages, possibly most frequently the pharyngeal tonsils, and my assumption was that the iodine would to some extent cause disinfection of the mouth, throat, and tonsils, and thus prevent or reduce the intensity of the disease. Moreover, the iodine increases the flow of saliva which in itself is prohibitive to the growth of the organisms, and a four-fold action is thus brought into force:

1. The local disinfectant action on application near the site of infection.
2. The action of the increased flow of saliva.
3. The action of the iodine after absorption.
4. The excretion of the iodine in the saliva and respiratory passages again acting as a disinfectant.

Ordinary tincture of iodine (*B. P.*) was mixed with an equal part of native honey, and, in the case of cerebro-spinal meningitis, instructions were given that two or three drops of this mixture should be placed on the tongue of contacts two or three times daily. A large number of cases of cerebro-spinal meningitis among natives was being reported monthly throughout the district, and all that can be said as to results is that no contacts who used it developed the disease, and the number of deaths reported fell in a few months from an average of 100 to an average of 40 a month. Strict isolation of contacts, however, was in force before the use of the iodine, and it was unusual for contacts to become infected after segregation. It is therefore doubtful whether the iodine had any effect, but the natives themselves had great confidence in its efficacy.

In influenza the results appeared to be more definite. No attempts could be made to distribute an experimental medicinal prophylactic among the natives generally; distribution was therefore confined to ten Europeans, about 100 Asiatic clerks and shopkeepers, and a few native chiefs, clerks, and servants of Europeans. The iodine was used in the same manner, but with the recommendation that applications should be made at least every three hours, or more frequently if convenient. This was in November, 1918, when the first suspicious case of influenza occurred near Mbarara. Towards the end of December the disease became prevalent throughout the district, and nearly every person, except some of those to whom the iodine had been distributed, suffered from the disease in a more or less severe form. Among the Europeans, who all used the iodine more or less regularly, no case occurred, although many were in daily contact with persons suffering from the disease. With regard to the Asiatics and natives to whom the iodine had been distributed, it was impossible to ascertain in most cases with what regularity the prophylactic had been used, but a large number escaped infection altogether, and others had the disease in a mild form with no complications. None of the natives using it died; the death rate among those who did not was high. Among the Asiatic population also there were no deaths, as compared with a mortality rate of 6.53 per cent. throughout the Protectorate.

Many instances occurred which appeared to prove the efficacy of the prophylactic and the value of frequent applications. In one family the father, who was in daily contact with influenza cases in all stages, used the iodine regularly and escaped altogether, while the remainder of the family, who had used it less regularly, had mild attacks. In another case, one child appreciated the taste of the mixture so much that he managed to obtain frequent applications and escaped infection, while all the rest of the family had slight attacks.

I have refrained from publishing these notes until now as I considered the results far from convincing. During the past year, however, I have had the opportunity of seeing several records of the use of iodine taken internally both in the treatment of and as a prophylactic for influenza. Possibly the iodine after lingual application instead of acting as a local disinfectant had its chief action through absorption, but personally I am convinced that its use saved several lives. Moreover, during the past year I have had the opportunity of using it with contacts of isolated cases of influenza, and all have escaped the disease. Possibly painting the tonsils and the back of the throat with iodine would be of greater value, but I consider this would be a too elaborate and unpleasant procedure to be adopted as a general prophylactic with regularity, whereas the placing of a few drops on the tongue is a very simple matter and may prove as efficacious if done with sufficient frequency.

I wish to thank Major C. A. Wiggins, Principal Medical Officer, Uganda Protectorate, for permission to publish this paper.

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

BILATERAL HYPOGLOSSAL PALSY DUE TO GUNSHOT WOUNDS.

A SIMULTANEOUS wounding of both hypoglossal nerves unaccompanied by any other serious injury, must be an uncommon event. I have short notes of two such cases and, though the records are imperfect and may show obvious defects from the neurological point of view, yet they may possess some interest.

CASE I.

Lance-Corporal S., wounded September 15th, 1916. A small fragment of shell has passed transversely across the inframandibular region. The wounds of entry and exit are both small, and correspond in position on the two sides. They are situated immediately below the mandible at the junction of the middle and posterior thirds of the horizontal ramus. Both hypoglossal nerves are paralysed. The patient cannot thrust his tongue forward, but can deviate it slightly from side to side, though not sufficiently to touch his cheek. He can dorsiflex the tongue, though not to a full degree, and can retract it fully towards the pharynx. The movements appear to be performed by the pharyngeal and extrinsic muscles, the tongue itself being almost inert except for the power of dorsiflexion. There is no loss of tactile sensation or of taste for salt in either half of the tongue. His pronunciation of the letters of the alphabet is given below.

CASE II.

Private G. N., wounded by rifle bullet, October 16th, 1916. The bullet has passed transversely below the lower jaw. The entry and exit wounds are small and symmetrically placed on the two sides immediately below the mandible, a quarter of an inch in front of the angle. The movements of the tongue are similar to those in Case I.

Pronunciation of the Letters of the Alphabet.

	Case I.	Case II.		Case I.	Case II.
A	āh	āh	N	en	en
B	bĕ	bĕ	O	o	o
C	cŏ	cĕ	P	pĕ	pĕ
D	vĕ (?)	dĕ (?)	Q	bōō	kew
E	ĕ	ĕ	R	ār	ār
F	eff	eff	S	ess	ess
G	vĕ (?)	dĕ (?)	T	fē	tē
H	hĭtch	aitch	U	oo	yew
I	i	i	V	vĕ	vĕ
J	wrĭ	dĕ-a (?)	W	bubbleoo	doubleyew
K	fī	kĕ	X	ex	ex
L	ell	ell	Y	wĭ	wĭ
M	em	em	Z	reb	zeb (?)

Regarding the vowels, neither of the patients could pronounce A, as in day, or a long E, while in Case I U could not be pronounced as yew. In Case II the only consonants which were quite impossible were G and J, while in Case I D, K, Q, T, W, and Z also offered complete stumbling-blocks. In Case II the pronunciation of D was doubtful, there being a very small sound of the consonant, which was overshadowed by the forcible expiratory sound which accompanied it, and careful attention was required to appreciate the "D." Speaking generally, there were but few articular sounds which were quite impossible, though there was a general lack of distinctness in the enunciation, while excessive expiratory efforts were brought into use in the endeavour to give precision to the individual syllables and words.

Southsea. HAROLD BURROWS, F.R.C.S.

Reports of Societies.

THE TREATMENT OF TRYPANOSOMIASIS.

AT the meeting of the Royal Society of Tropical Medicine and Hygiene on May 20th, the President (Professor W. J. R. SIMPSON) in the chair, a paper was read by Dr. CLAUDE H. MARSHALL on "A new method of treatment of trypanosomiasis," embodying the results given in an article by himself and Dr. Vassallo which is printed in full in this issue of the BRITISH MEDICAL JOURNAL (p. 773). Dr. Marshall's previous report on the treatment of sleeping sickness by combined intravenous and intrathecal injections of "salvarsanized serum" appeared in the BRITISH MEDICAL JOURNAL of May 22nd, 1920, p. 702. A former patient, the only European patient, to whose case Dr. Marshall referred in detail, was present at the meeting, and was congratulated by the President and others on his appearance of excellent health. After relating particulars of the technique, the cases, and the results, substantially as in the paper published in this issue, Dr. Marshall went on to suggest that the curative effect of the serum treatment resulted from the formation and action of some form of trypanolysin. If the theories of Dr. Vassallo and himself were correct, there was no reason why animal serum should not be used for treatment, why some degree of prophylaxis and immunity to trypanosomiasis should not be obtained, and why early diagnosis should not be effected by some form of complement fixation test. Dr. Vassallo was now carrying out experiments on these lines. The line of treatment adopted for human beings might probably be applied to animals; the cure of "fly" disease in horses and cattle should prove of great economic value, but he appealed for the assistance of the veterinary branch of medical science in such researches, in particular for the co-operation of a veterinary officer in future work.

The PRESIDENT said that he considered the investigation to be one of the most important that had ever been placed before the Society. If the results described were maintained in the future and were confirmed by further investigation it opened up a new and brilliant era for the prevention and treatment of trypanosomiasis. What that meant for humanity they could imagine by recalling the vastness of the region infested by the tsetse fly. Dr. Marshall's observations were not carried out on the lower animals, but on men and women, and the results certainly seemed to indicate a reduction in the mortality in one form at least of the disease. Dr. Marshall had rightly excluded 23 cases treated for less than six months, but that left a series of 30 cases, of which it was found that 22 (or 73 per cent.) were alive and well after more than six months, while of 13 cases treated for over a year 9 (or 69 per cent.) were alive and well. This was putting the successes at their lowest. It remained to be seen whether the same favourable results could be obtained in the Rhodesian type of trypanosomiasis. He saw no reason why this should not be, seeing that treatment was based on a scientific foundation. He hoped that some movement might be inaugurated for putting this treatment to the test on a larger scale. He agreed that the veterinarian should come in to assist, and other scientific workers also, but a Rockefeller was badly needed to help financially.

Professor W. D. HALLIBURTON dealt specially with a point referred to him by the President—the reason why in cerebro-spinal trypanosomiasis it was of no use injecting anything into the blood. The cerebro-spinal fluid, he said, was really a secretion not a leakage fluid from the blood. It was sometimes called the lymph of the brain, but that was a very slipshod expression, for in lymph there was always a possible passage of materials in both directions, from blood to lymph and lymph to blood, whereas in the case of this particular fluid there was a passage of only a constant saline material which maintained the normal osmotic pressure which was beneficial for the life of the nerve cells, and in disease as well as in health the choroidal cells maintained a stalwart barrier against the entrance of foreign material which might be circulating in the blood. Only one or two volatile materials, of which alcohol was the best known, got through. It was a matter of congratulation to Dr. Marshall and his colleague that they had found a material which was fatal to the parasite but not fatal to the host.

Dr. P. MANSON-BAHR asked whether the invasion of the cerebro-spinal fluid was necessary to produce the sleeping sickness; he held that it was not. He had one case from the Congo, first infected in 1916; there was little doubt that the patient had trypanosomiasis, but during five years, only on one occasion had trypanosomes been found in his blood. His state of trypanosomiasis was most typical, and yet for three years now there had been no direct scientific evidence for the condition. In another case under his observation Dr. Marshall's and other treatments had been tried without making the smallest difference to the number of trypanosomes found in the blood. In estimating the effect of drugs on trypanosomiasis the fact must be taken into account that the protozoa had a periodic habit in the blood; in the case in question they reappeared every three weeks, the man usually having about sixteen trypanosomes for every 200 leucocytes. The speaker held that there was no reason why trypanosomiasis should not be a self-limiting disease, and the wonderful cures reported might be due to the nature of the body resistance rather than to any drugs injected.

Dr. G. C. Low supported the criticisms of Dr. Manson-Bahr, and asked what foundation there was for supposing that a few cases treated up to thirteen months had been cured. He did not think that a case could be regarded as cured until after a period of at least three years. Sleeping sickness had probably become more chronic in form in Uganda since he himself began the study of it there twenty-one years ago, and this was the more reason against being over-definite in the description of results as cures after so short a period of time.

Dr. W. T. PROUT refused to take such a pessimistic view as Dr. Manson-Bahr and Dr. Low, and he thought that the indications were that Dr. Marshall's use of the word "cure" was justified.

Dr. C. F. HARFORD thought that the cases which filtered through into our hospitals at home could not be classed in the same category as the cases dealt with in the country of their origin, and this might account for the differences of opinion among observers.

Dr. MARSHALL, in a brief reply, said that because quinine and salvarsan had occasionally no effect in malaria and syphilis respectively, that was no reason why they should not remain as routine treatment, and he thought that the same principle held good in the matter under discussion. Dr. Low had suggested that it was too soon to say that the patient who had been brought forward that evening was cured, but at any rate he did not look as though he were troubled by sleeping sickness or anything else! The European had a higher resistance to trypanosomiasis than the native. Dr. Marshall added that he and his colleague in Uganda would very much welcome further tests.

Colonel R. H. ELLIOT said that a number of members of the Society who were interested in varying degrees in Dr. Marshall's work felt that an opportunity for the further continuance of that work ought to be given. Some representations should certainly be made to the Colonial Office in favour of a complete investigation, not only of human but of animal trypanosomiasis. They all knew the anxiety which the disease had given to the Government of Uganda, and the enormous advantage which would accrue if the treatment proved effective.

Sir HUGH CLIFFORD, Governor and Commander-in-Chief of Nigeria, said that the tropics seemed to be differentiated from the rest of the world by their subjection throughout recorded ages to the domination of insect-borne disease. This fact had determined their history to a great extent and the character of their people. It must be admitted that Dr. Marshall's discoveries called for further investigation, and experiments should be carried out systematically and scientifically by the ablest officers. He would personally address the Secretary of State on behalf of the Government he represented, urging that this important discovery should be taken up scientifically by the medical department in Nigeria, and if it was going to cost a few thousands his Government would not grudge the expenditure in so good a cause.

Dr. JENSEN then proposed and Colonel ELLIOT seconded a motion that the Society was of opinion that every facility should be given for the furtherance of Dr. Marshall's work and investigations. This was carried unanimously, and it was understood that the resolution would be conveyed to the Colonial Office.

FIBROUS AND MUSCULAR ATTACHMENTS OF THE VAGINA.

AT a meeting of the Obstetrical Section of the Royal Academy of Medicine in Ireland, on April 29th, with the President, Dr. E. HASTINGS TWEEDY, in the chair, Dr. LOUIS CASSIDY read a paper on the fibrous and muscular attachments of the vagina. In the course of his communication he showed (by various lantern slides) that the lower two-thirds of the lateral walls of the vagina were in close apposition with the levatores ani muscles. Interposed between the lateral walls of the vagina and these muscles was a distinct layer of fascia—a portion of the visceral layer of the pelvic fascia—which gained a very definite attachment to the walls of the vagina. This layer was clearly demonstrable, and was intimately blended with the fasciculi of the levatores ani muscles. When followed forwards immediately below the neck of the bladder this fascia was found to be continuous with the pubo-vesical ligaments, whilst behind it passed into the fascia surrounding the rectum. The surface of this layer of the fascia, which rested upon the levatores ani, sent prolongations into the muscle to blend with its sheath, thereby indirectly supporting the vagina. The anterior and posterior fascial supports of the vagina resolved themselves into the attachments between the fibrous covering of the posterior wall of the urethra and the anterior fibrous sheath of the rectum behind. The attachment between the wall of the urethra and vagina was a very close one, the structures being morphologically continuous, and was associated with the presence of the dense mass of fibrous tissue which in this region occupied the space left by the disappearance of the female prostate; it was impossible to separate the two structures in their lower two-thirds, the knife had to be used. The union of the lower three-fourths with the rectum and anal canal was much less intimate and permitted of easy separation. This relationship between the rectum and vagina was much strengthened at the junction of the rectum and anal canal by the presence of the perineal body. This structure was a wedge-shaped mass consisting of fibro-muscular tissue, and was about one inch in depth, the base of the wedge lying at the skin surface (Tandler).

The vagina pierced the two layers of the triangular ligament, and consequently received firm support from this structure. The muscular attachments of the vagina were solely comprised by the levatores ani. A transverse section through the pelvis of a female child aged 19 months, and taken through the middle of the true pelvis, demonstrated the attachments of fibres of the levatores ani muscles to the lateral walls of the vagina. This relationship was denied by such eminent authorities as Halban and Tandler, as well as Cruveilhier. In conclusion, the writer was convinced that the prevention of a hernial protrusion of the anterior and posterior walls of the vagina depended on the lateral support it received from the pelvic fascia and the integrity of the perineal body. He considered this latter structure of paramount importance in the mechanical support of the female pelvic diaphragm. There was one other point to which attention might be drawn—the presence of the transversalis colli, or Mackenrodt's ligaments. These structures would be readily recognized in transverse section through the pelvis of a young female child. That these ligaments did very materially support the upper third of the vagina there could not be much doubt.

Dr. GIBBON FITZGIBBON agreed with Dr. Cassidy about the value of the pelvic fascia. Referring to the parietal and visceral layers, he thought that anatomists did not go far enough. He was of opinion that the former was merely the covering of the levator ani muscle. The actual supports of the vagina were well shown by Dr. Cassidy. He thought there was just as much fascia round the parametrium as in Mackenrodt's ligaments. The parametrium was all muscular and contained very little fascia, and this was the real support of the vagina.

Dr. BETHEL SOLOMONS was greatly struck by the fact that in Dr. Cassidy's ardent researches it had been found that Mackenrodt's ligaments were not the only supports of the vagina. He believed that in further research the essayist would find that Mackenrodt's ligaments were probably the most important but not the only supports of the pelvic viscera. The old argument, that in cutting through these ligaments the fact that the uterus descended proved that these were the only supports, did not hold water, any more than the fact that after the removal of one limb the body being supported by the other proved that the body was supported by one lower limb. He asked the essayist what constituted the pillars of the bladder which were so useful in acting as supports for the bladder in the operation for the cure of cystocele. Did he consider them to be a portion of the pubo-coccygeus muscle with or without fascia, or possibly the detrusor muscle of the bladder?

The PRESIDENT regretted that Dr. Cassidy had not gone further and demonstrated the attachments of the uterus, but hoped he would bring it forward on a future occasion. In his (the President's) opinion these fibrous attachments were the supports of the uterus as well as of the vagina. The Master of the Rotunda (Dr. FitzGibbon) was right in saying that the strands of fibrous tissue in the pelvis ran in every direction, and different names — Mackenrodt's ligaments, utero-sacral ligaments, etc.—had been given to different bundles of these. The theory of the pelvic fascia was fascinating. He believed that the uterus was the origin of these strands, which grew out from it in all directions, and they might fitly be described as "uterine tendons." These tendons or ligaments contained muscle, and were under the control of the uterus, and, he believed, were its sole support.

Primary Carcinoma of the Vagina.

Dr. GIBBON FITZGIBBON showed a specimen of primary carcinoma of the vagina, from a patient aged 42, 7-para, whose last pregnancy, four years ago, was normal. Her menses were regular and normal, and she was quite well up to two months ago, when slight bleeding from the vagina started and continued. On examination, the vulva and perineum were quite healthy. From the right lateral fornix of the vagina there was an ulceration extending slightly on to the posterior wall and down the lateral wall to about an inch and a quarter from the hymen. The ulcer looked very clean, the surface a little irregular and soft, and the edges fairly sharp. There was no evidence of rectal or bladder involvement. The ulcer ran close up to the cervix, but did not encroach on its mucous membrane. By the rectum a hard nodule could be felt under the ulcer, extending out towards the pelvic wall, but mobile. The surface of the ulcer was removed with the curette and some pieces of the edge cut away for examination.

The pathological report was that it was a definite cancerous growth, showing dense masses of cells.

First, by the abdomen, the ordinary lines of a Wertheim's hysterectomy were carried out, until the whole of the vaginal fornices were quite freed. The internal iliac vessels were cleared and tied at their origins. The patient was then put into the lithotomy position and the vagina divided just inside the hymen all round and separated up, taking as much of the tissue in the ischio-rectal fossae as possible, until the detached upper part was reached, when the whole mass of the vagina and uterus was removed through the vulva. The edges of the vulva were fixed with a few stitches and the rest of the operation done by the abdomen. The pelvic peritoneum was closed over a gauze packing. The patient was severely affected by shock, but responded well to a coffee enema, followed by small saline enemas during the next twenty-four hours, and made an uninterrupted recovery, the abdomen healing perfectly.

A few days before operating on this case Dr. FitzGibbon operated on another patient in whom the cancer was also primary in the vagina and situated in the lower half, just coming down to the level of the hymen. There was a mass extending out to the ischio-rectal fossa and a hard ring round the vagina, but the ulceration was only lateral. In this case he removed the whole vagina from the lesser labia, the edge of the perineum, and the external meatus of the urethra up to the vaginal fornices, and taking the vaginal portion of the cervix. Of the two operations he considered the former was the easier. There was less haemorrhage, owing to the internal iliac vessels having been tied, and the removal of parametrium above the fornices was much more complete and simple. Should he have to operate on cancer of the vagina again, he would do the operation—including the removal of the uterus—in three stages, as in this case. It was surprising how little arterial bleeding occurred, only two or three small vessels requiring to be tied, but there was rather profuse venous

bleeding for a time, and this was avoided in the case with hysterectomy.

Dr. SOLOMONS, Dr. MADILL, and the PRESIDENT spoke and Dr. FITZGIBBON replied. Dr. R. E. TOTTENHAM showed a new type of pelvimeter.

RENAL DIABETES.

AT a meeting of the Royal Medico-Chirurgical Society of Glasgow, held on April 15th, the PRESIDENT occupying the chair, Dr. ADAM PATRICK described a case of renal diabetes. In the normal person, he said, the blood sugar varies from about 0.07 per cent. to about 0.15 per cent., or rather more. If the latter concentration is exceeded, sugar appears in the urine. In healthy persons it is difficult to raise the blood sugar above this level. In the diabetic the threshold concentration is habitually exceeded, and readings of 0.25 per cent., or much higher, may be obtained. A single reading of this kind is enough to establish a diagnosis of true diabetes. Sugar may also appear in the urine if the renal threshold is lowered, even if the blood sugar does not exceed the normal. In the normal subject the limit of sugar concentration is reached in about an hour, whereas in the diabetic the maximum is not reached for two or three hours. The case described, that of a man aged 38, was found to have glycosuria on examination for life insurance, although five years before there was certainly none. His health had been good, save for an attack of haematuria (cause unknown) ten years before. At the latter date there were no symptoms. Treatment on the lines suggested by Allen was instituted without great success, and the urine only remained sugar-free on a diet approaching starvation. In hospital it was found that on a very restricted diet, and with the blood sugar reading only 0.05 per cent., there was a trace of sugar in the urine; on ordinary diet there was abundant sugar in the urine two and a quarter hours after dinner, although the blood sugar was only 0.114 per cent. Tested by administration of 25 grams of glucose after a sixteen hours' starve, the blood sugar curve was normal in type. The name "renal diabetes" is applied because the glycosuria appears to be due to a defect in the kidney.

Professor MUNRO KERR read notes of a case of resection of a double uterus, followed by two full-time pregnancies. He also showed the uterus, which had been removed after a Caesarean section. The diagnosis lay between an extra-uterine pregnancy, a myoma contracting a uterine pregnancy, and a pregnancy in the horn of a double uterus. Matters were cleared up by the expulsion of the ovum from the right horn of a uterus bicornis. The patient had a second miscarriage at a later date from the same horn. Both miscarriages occurred at the third month. The resection of the uterus (uterus bicornis unicollis symmetricus) was done seven months after the last miscarriage. A V-shaped wedge was removed and the two halves of the uterus carefully stitched together. Pregnancy followed soon afterwards and proceeded to full time. A living child was delivered with forceps, but died owing to injuries sustained at birth. The uterine scar was found by manual examination to be quite satisfactory. Some months later the patient again fell pregnant, and at full time Caesarean section was performed and the uterus removed. Professor Munro Kerr demonstrated the uterine scars on the anterior and posterior walls of the uterus. These, especially that on the anterior wall, were satisfactory, but there was a gutter-shaped indentation in the posterior wall over which the placenta was attached. Microscopically a great deal of connective tissue was seen in the scars, particularly in the posterior one. The operation had been done on one or two occasions in Continental clinics, but, so far as Professor Munro Kerr knew, not previously in this country. The indication for the operation was the repeated miscarriages, which seemed to be common in this form of malformation.

Dr. JAMES HENDRY described a case of amenorrhoea following severe trauma. In May, 1919, the patient reported three months' amenorrhoea without other signs of pregnancy. Her appearance suggested thyroid insufficiency, and there was no sign of pregnancy. The disturbances suggesting thyroid insufficiency were only of recent date, and her health previously had been good. Treatment with thyroid extract was prescribed and continued for a few weeks without any improvement, and, in fact, the patient became stouter and more drowsy and apathetic. On again reviewing her history in detail, it was discovered that a few weeks before the patient's first missed period she had fallen in the street on the back of her head during frosty weather. Next day her sight was affected and vision was almost lost, but had almost completely returned. Dr. Hendry then thought of a possible lesion of the pituitary gland, and administered orally tablets of pituitary (whole gland) without any success. By June, 1920, a fairly well developed Fröhlich's syndrome had shown itself—dystrophia adiposo-genitalis, with lethargy and somnolence; menstruation had returned in scanty form, lasting one day. A skiagram of the skull to show the sella turcica was obtained, and signs of a fracture were marked. The patient, further, could ingest 300 grams of glucose without glycosuria. The oral administration of pituitary gland having proved unsuccessful in most points, pituitrin, administered by hypodermic injection, was tried, with no success. Five months ago, hypodermic injections of antuitrin (extract of the anterior lobe) were commenced, and weight was now steadily diminishing, although food intake was normal. Regarding sugar tolerance, 120 grams of glucose now produced glycosuria. The special interest in this case was the association of amenorrhoea with hypopituitary function.

VITAMINS.

AT a meeting of the Pathological Society of Manchester on May 11th, Professor E. MELLANBY, M.D., of Sheffield University, lectured on vitamins. He stated that in consequence of two discoveries—namely, (1) that some proteins have a higher food value than others, (2) vitamins—the isodynamic theory of diet must be abandoned. Diet had now become a question not of quantity but of quality, and the whole science of nutrition was in the melting-pot. He traced the history of the experimental work on vitamins, including the work of Hopkins in 1911, when it was proved that animals would not grow on purely synthetic foods.

Describing the three recognized vitamins, (1) anti-scorbutic, (2) antiberiberi (water-soluble B), (3) antirachitic (fat soluble A), he explained that they had in common the properties that their chemistry was entirely unknown, that animals could not synthesize them but could only obtain them from the vegetable world, and that they were influenced greatly by the way in which our food was treated. Experiments were described showing the effect of vitamins on calcification processes, the prevention of rickets and the production of good and bad teeth. The consideration of rickets was complicated by the fact that it was a disease of growth. Enlarged epiphyses could be produced by any method leading to a deficiency of calcium in the body. Antirachitic vitamins prevented rickets by allowing the body to make use of the calcium at its disposal. In experiments in which animals were kept on a rickets-producing diet, it was found that, other factors being constant, the more white bread that was given the worse was the degree of rickets, whereas meat had a slight antirachitic effect. Dealing with the controversy concerning the etiology of rickets, Professor Mellanby outlined his grounds for the view that diet was the chief factor, and exercise and sanitation purely subsidiary.

The question of dental caries was then discussed in the light of experiments which showed that the main factor in its causation was not lack of cleanliness but improper feeding during the period of formation of the teeth. The experiments showed that when once good regular teeth were produced in dogs they were much more immune to caries than were irregular, badly formed teeth produced on rachitic diet, and it appeared that fat-soluble A was the all-important factor. The question whether there were more vitamins to be discovered was often asked, but had not been conclusively settled. There were certainly other factors in diet the importance of which was unknown at present. The thyroid gland was examined in dogs fed on a diet containing various fats; when fed on butter, cottonseed oil, or linseed oil, the thyroid was invariably large, and resembled histologically that of Graves's disease, whereas on a diet containing cod-liver oil it was small and histologically normal.

AT a meeting of the London Association of the Medical Women's Federation, held on May 10th, with Mrs. FLEMING, M.D., in the chair, Miss E. C. LEWIS, M.S., F.R.C.S., read a paper on "Tuberculous adenitis, its diagnosis and treatment." She confined her attention to the superficial glands, of which the most important were the cervical, which were affected in about 93 per cent. of the cases of superficial adenitis. The reason for their peculiar vulnerability was the importance of their drainage area, since they receive lymph from the teeth, tonsils, tongue, and palate. The age-incidence of cervical adenitis was the same as that of chronic simple enlargement, the greater number of patients being under 10 years of age. All varieties of adenitis were commoner in the female sex. Miss Lewis discussed the clinical picture of these cases and gave a detailed account of important points in diagnosis between tuberculous adenitis, lymphadenoma, and chronic septic adenitis. Other forms of glandular enlargement, such as those due to syphilis and new growths, rarely led to difficulty in diagnosis. In describing treatment stress was laid on the importance of early diagnosis, of clearing-up septic processes in the drainage area of the glands, and of general medical treatment before operation was undertaken. The value of *x*-ray treatment in cases where glands had broken down was emphasized. A discussion followed, in which Dr. JANE WALKER, Dr. E. CARLING, Dr. R. JORDAN, Miss WHITE, Miss C. KING, and others took part.

Rebielus.

INTESTINAL TOXAEMIA.

DR. ALEXANDER BRYCE,[1] the author of *Intestinal Toxaemia or Autointoxication in the Causation of Disease*, hopes that although primarily designed for the medical profession, his clearly written book may, in spite of scientific terms, appeal to a much wider public. Briefly expressed, his view is that of Dr. A. Haig, with the important substitution of "toxic substances" for "uric acid" as the *fons et origo* of numerous human ills. His outlook is therefore on much the same lines as those of Metchnikoff, Sir Arbuthnot Lane, Kellogg, and Danysz, though he is not a slavish follower. He has obviously had considerable personal experience, and read widely in connexion with his subject. The objections to the conception of autointoxication from intestinal stasis are stated from the standpoint of "the pure scientist," for whose "meticulous caution" in accepting conclusions without indisputable proof he expresses sincere admiration. Dr. Bryce frankly admits that there is probably no single disease which can with absolute confidence be identified as the direct product of intestinal toxaemia, and that there are many diseases of such obscure origin that it is tempting to ascribe them to toxic absorption. But he is inclined to regard the evidence in favour of his thesis as circumstantial, and this is duly set out with full references to the work of others. The most convincing proof of the doctrine of autointoxication, he thinks, is to be found in the benefit obtained from the adoption of methods designed to combat it. These are a correct diet with a low protein content, fleshless, and taken in meals three times a day; an action of the bowels after each meal; encouragement of saccharolytic and discouragement of proteolytic bacteria in the intestine; and attention to all the laws of health. A weekly intestinal douche is recommended; the vertigo sometimes attributed during the summer to liquid paraffin can thus be prevented. The objection to paraffin that it may escape from the anus apart from defaecation, can be obviated by taking it once only in the twenty-four hours, and just before going to bed; failure of paraffin to penetrate the faeces can be met by taking bran or agar-agar, the faeces being thus rendered more permeable.

PATHOLOGY OF THE BLOOD.

THE second, enlarged, edition of BURNETT'S *Clinical Pathology of the Blood of Domesticated Animals*,[2] though dated 1917, only reached us on March 21st, 1921. It is intended for the use of veterinary surgeons and for those who need to know details concerning the common experimental animals. It is arranged as is usual in textbooks of human haematology, and makes full use of data obtained from these sources. The first two chapters are devoted to methods of examination and morphology. In the third chapter details are given of the normal blood counts of various animals. There follow chapters on red and white cell variations; on special, general, and infective diseases; and on diseases due to protozoa and parasites. The illustrations are plentiful and good.

The author is professor of comparative pathology at the New York State Veterinary College, and many of his comments are well worth the attention of clinical pathologists. We do not remember to have seen in any textbook of haematology any such statement as the following: "The liver is the organ best adapted to distinguish, by histological examination, leukaemia and pseudo-leukaemia from generalized sarcoma. The characteristic collections of cells found in pseudo-leukaemia and leukaemia do not occur in sarcoma." Medical literature contains some hundreds of papers devoted to the differences between these diseases, but without any mention of this point, which constitutes an easy and accurate means of distinguishing them. On the other hand, page 13 conveys the intelligence that the standard solution in Sahli's haemoglobinometer is "haemoglobin in glycerin," and the author seems to prefer the very unstable solution of Gower to the Haldane modification or to that of Sahli. Nor can we agree with the statement made of Hodgkin's disease on page 92, that it "cannot be differentiated from lymphatic leukaemia anatomically or histologically if the blood be excepted."

The book is thus uneven in its merits. This is perhaps due to the fact that the author has relied chiefly on the textbooks of Ewing, Cabot, Da Costa, v. Limbeck, Naegeli, and Grawitz, none of which have seen new editions for many years.

THE PSYCHOLOGY OF FUNCTIONAL NEUROSES.

THE volume entitled *The Psychology of Functional Neuroses*[3] is the outcome of the experience Professor HOLLINGWORTH gained from the study of 1,200 soldiers with persistent neurotic symptoms in the U.S. Army General Hospital. He made systematic observations to determine the intellectual status of these patients by the usual intelligence tests, and upon the results obtained he formulates a theory to account for neurotic manifestations as a whole.

According to Professor Hollingworth, all psychopathologists have missed the essential factor in the genesis of neurotic symptoms, and these are not, as Freud, Jung, and Adler would have us believe, the expression of disturbances in the emotional and instinctive sphere, but are rather the result of intellectual deficiency. In the first place, the author utilizes Hamilton's term, "redintegration" to explain all nervous reactions. "Redintegration," he writes, "is to be conceived as that type of process in which a part of a complex stimulus provokes the complete reaction that was made previously to the complex stimulus as a whole." This concept, which incidentally has been freely utilized by every psychopathologist of whatever school of thought, the author finds to be one "that is significantly descriptive of the psychoneurotic picture, that unerringly identifies the patient, explains the psychogenesis and idiosyncrasy of his symptoms, points the way to therapy and prophylaxis, and is yet intrinsically intelligible, is relevant to the systematic accounts of the average mind, and for which a neural counterpart or correlate is without difficulty conceivable." Thus far psychopathologists will scarcely take exception to the writer's views. He has repeated something with which they are perfectly familiar and which expresses no new idea. When the shell-shocked soldier hears a gun fired or any sudden noise all his previous fear reactions—tremors, mutism, and so on—are, of course, apt to return. The explanation here given, however, of these abnormal reactions is so contrary to the concepts of modern psychopathology that it requires much more proof than is brought forward in this volume. These symptoms the

[1] *Intestinal Toxaemia or Autointoxication in the Causation of Disease.* By Alexander Bryce, M.D., C.M., D.P.H. London: Andrew Melrose, Ltd. 1921. (Cr. 8vo, pp. 191. 6s. net.)

[2] *The Clinical Pathology of the Blood of Domesticated Animals.* By S. H. Burnett, A.B., M.S. Second edition, revised and enlarged. New York: The Macmillan Co. 1917. (Med. 8vo, pp. 182; 23 figures. 13s. net.)

[3] *The Psychology of Functional Neuroses.* By H. L. Hollingworth, Associate Professor of Psychology in Columbia University. New York and London: D. Appleton and Co. 1920. (Demy 8vo, pp. 271. 10s. 6d. net.)

author ascribes to an intellectual defect, a lack of *sagacity* or ability to comprehend properly the part in relation to the whole and to discriminate out of a whole the appropriate, relevant, or significant detail. A neurosis is thus apparently to be regarded as a form of congenital intellectual deficiency. The psychoneurotic is deficient in *sagacity* as the feeble-minded is in the capacity for *learning*. We should have imagined that there was quite sufficient evidence to show that the redintegrative reactions in the psychoneuroses were the result of the suppression of painful experiences rather than the expression of stupidity. Professor Hollingworth objects to the whole terminology and conceptions of the psychopathologist, and there is here, no doubt, a legitimate field for criticism, but he would scarcely seem to be in a position to dispute the basic conceptions which have been formulated as to the significance of neurotic symptoms. If he objects to the concept of the unconscious, he need only refer to the work of Schwab in his own country in which an objective and physiological conception of the psychoneuroses is developed, but this writer finds, as all psychopathologists have hitherto done, that these disorders have their origin in the instinctive rather than in the intellectual mental life.

The actual data upon which the author bases his hypothesis are by no means convincing. It is true that he finds many of his cases slightly subnormal in intellectual level, but these patients are obviously in no sense representative of the psychoneurotics found in civil life, and neither can they be regarded as characteristic of the mentality of the whole group of war neurotics. However this may be, 787 out of the 1,172 cases tabulated in his book are not neurotics at all, but are classified under the headings of mental deficiency, epilepsy, constitutional psychopathy, concussion, cerebro-spinal meningitis, organic conditions, psychoses, and undiagnosed. While this study may have some value as a mere record of the mental level of a number of nervous cases, as a contribution to the psychology of psychoneurotic symptoms it is of but little significance.

STEDMAN'S MEDICAL DICTIONARY.

WE have remarked before on the debt owed by English-speaking members of the medical profession to the United States for the many excellent medical dictionaries produced in that country, and for the speed with which revised editions are brought out. The sixth edition has now reached us of the *Practical Medical Dictionary*,[4] by Dr. T. L. STEDMAN. It is only ten years since this work first appeared, and the favour with which it has been received is proved by the fact that a second edition was needed within eighteen months, and that since then a new edition has been called for every second year. The first edition was noticed at some length in our columns at the time. The general style and arrangement have been preserved, but the number of pages has had to be increased to keep pace with the ever-growing number of new words and altered meanings. With a lexicon of this size and scope the work of continuous revision and correction must be very heavy; the author speaks of it in his supplementary preface as a truly Sisyphean task, "one edition being no sooner published than the collection of new words and new uses of old words begins anew." So far as we have been able to test the new edition, this dictionary appears to maintain the accuracy and the clearness of definition which have made it so popular as a work of reference in medical libraries.

ELECTROTHERAPY IN UROLOGY.

DR. COURTADE has collected into one volume, entitled *Notions pratiques d'électrothérapie*,[5] much that it is useful to know on the subject of electrotherapy applied to urological conditions. There is perhaps no branch of surgery in which electrotherapy holds a more important position than in the surgery of the genito-urinary system, and Dr. Courtade's book should certainly be of great utility. To write a work of this kind requires special qualifications such as few men possess. It needs a greater knowledge of electrical instruments than most medical men have, and at the same time demands considerable experience in urology. Dr. Courtade appears to be eminently fitted for the task which he has undertaken. The book is divided into two parts. In the first part are described the different varieties of an electrical current, the means by which they may be generated, and their action on tissue in general. The second part is devoted to a consideration of the various lesions of the genito-urinary tract that are amenable to electrical treatment. Advice is given as to the best form of such treatment for the various lesions described, and, where possible, the reasons are supplied why a particular form of current is better than another. Although the second portion of Dr. Courtade's book does not contain a great deal of new material, certain minor changes are effected which are doubtless improvements. The work should prove interesting to urologists and electrotherapeutists alike.

[4] *A Practical Medical Dictionary.* By Thomas Lathrop Stedman, A.M., M.D. Sixth revised edition. London: Baillière, Tindall, and Cox. 1921. (Roy. 8vo, pp. 1160; illustrated. 42s. net.)

[5] *Notions Pratiques d'Electrothérapie appliquée à l'Urologie.* By Dr. D. Courtade. Second edition. Paris: E. le François. 1921. (Roy. 8vo, pp. 244; 37 figures. Fr. 18; post free, Fr. 19.80.)

NOTES ON BOOKS.

IN his *Letters to a Nurse*[6] "A Midland Doctor" (who from the preface we may suppose to be Dr. F. G. Layton) provides some instruction for probationers on the nature and origin of disease, and on the duties of nurses to patients. The instruction is sound and on the right lines. But the author's main purpose appears to be to encourage the probationer with his fatherly—or avuncular—advice to endure the drudgery and hardships of her early training, and at the same time to rebel against certain abuses, such as bad feeding, excessive hours of duty, and the deadening hospital routine. Incidentally the letters are used as a means of attacking many priests and some matrons and ward sisters. The matron or sister who is a martinet may well have attention directed by a doctor to her shortcomings, but the priest is in a different position; there seems to be no good reason why the Midland Doctor should use his letters to nurses as a medium for an attack on another profession; especially when, in doing so, he may hurt the religious susceptibilities of some young women. It would be wiser to address a separate series of letters to a priest. By using Lord Chesterfield's method, and addressing letters to his niece, the author is able to allow himself much latitude in style. But his illustrious predecessor would hardly have written "the very most difficult"; "conscious 'doing good' is the very most priggish of vices"; "we know different, don't we?" or "I shall go and find out what is the reason why." The vigour of his sentiments may be gathered from his denunciatory remarks on charity and the voluntary system; his sense of humour by his quotation of the message from a lady patient, "Will you please call to-morrow as little girl is ill at your convenience and oblige."

[6] *Letters to a Nurse.* By a Midland Doctor. London: J. Bale, Sons and Danielsson. 1921. (Fcap. 8vo, pp. 99. 5s. net.)

APPLIANCES AND PREPARATIONS.

A Draining Rack.

THE "Rycott" draining rack, of which we have received a sample, is a simple wooden device for draining glass tumblers, measure glasses, and cups. Articles after being washed can be placed between the slits of the pegs and left to dry, as shown in the illustration. The rack is made either to stand on the table or to fix on the back of a sink; single pegs are also made to

screw on the side of the plate rack or the draining board. The rack, or pegs, should prove a convenience in laboratories, dispensaries, and photographic dark rooms. The price of the rack is 2s., and single pegs are 3d. each. They may be obtained from Messrs. Maw, Son and Sons, or from the makers, Messrs. Rycott and Dixon, 115, Balham Hill, London, S.W.12.

THE Czecko-Slovak Red Cross has organized forty country colonies for a total of 10,000 children and will shortly open a children's hospital.

THE ORGANIZATION OF SCHOOL OPHTHALMIC WORK.

BY

N. BISHOP HARMAN, F.R.C.S.

ALL the mental and physical powers of a child are brought into play in school life. Defect in one of these powers will act as a handicap. The child with a defect will not be able to do so well in work or in play as the better equipped child. Some defects are more than handicaps; they may become irritants and react on the general welfare of the child. A child with some degree of deafness will fail to hear low tones; the failure is a loss. The sensitive child may be aware of the loss and worried by it, but the effort to hear will involve no ill effect. A child with defective sight will fail to see clearly; the loss may cause worry, but more serious is the likelihood that the effort to see will cause a strain that may further damage the eyes and even disturb the balance of the nervous system. The ill effects of defective sight are progressive and cumulative. If we leave out of account the dominant part played by sight in the development of human mental and physical powers, still the significance of defective sight is such that no effort is lost which seeks to diminish or ameliorate the defect.

The Discovery of the Defect.

Parents are so accustomed to their children and their ways that they can rarely be relied upon to notice any but the most obvious defects. The school becomes the testing ground of the physical qualities of the child even as it is of its mental capacity. Mentality and physique are so closely involved that teachers need as much training in the observance of physical characters as they receive in scholastic and mental culture. It is desirable that teachers should receive in a course of school hygiene instruction in the recognition of simple eye defects, such as the recognition and dangers of sore eyes, the seriousness of squint and the urgency of its early and continuous treatment, and in the methods of measuring and recording visual acuity. An educated and observant teacher is the first line of defence in protecting the child from the strain arising out of its inherent disabilities. Every teacher ought to know the meaning of a vision test-type, and be able to discover the value of a child's sight by the use of that test and to record it. Many teachers have learnt this during school medical inspection; not a few instances have come under notice of the value of this knowledge; one may be cited:

During the visit to a school for a purpose unconnected with inspection a school doctor was asked to look at a boy, for his teacher had noticed that he could not see properly; the previous term's vision had been 6/6; when he was tested by his teacher that week his vision was only 6/60; examination of the boy showed that he was suffering from acute optic neuritis.

The test-types should be a familiar object in the school, and it should be of such a kind that it cannot be memorized however frequently seen. For this reason experience shows the advantage for the school use of the E-sign card, in which there is only one sign for each grade mounted on a turntable that may be moved at will. The test cannot be learned; it requires no knowledge of letters; the response is simply the movement of the hand to correspond with the position of the pointers of the sign.

There appears to be no reason why an initial test of vision should not be done by the teachers; it would give them a knowledge of their charges that they would not otherwise obtain, and it would accentuate their interest in the conservation of child sight. These preliminary findings would be at the service of the school medical inspector at his visitation. Observant teachers are most of all necessary in infant departments. At present infants under the age of 7 years attending school do not have their eyes examined; yet I have shown by a routine examination by objective methods of the eyes of all the infants attending a large good class elementary school to the number of 368 that 36.9 per cent. had defects of the eyes and no less than 16 per cent. considerable defect (*Trans. Ophthal. Soc. U.K.*, 1919, p. 89). These infants, fit and unfit, do the same work; and it must be remembered that what we adults think easy infantile tasks are in reality very laborious and fatiguing to infants. It is not practical to attempt to distinguish these defects by a vision test with test-types. The test could only be made satisfactorily by the routine objective examination of the eyes of each entrant by the medical officers, just as though the child had been referred to the clinic for defective vision. If such a course could be adopted it would be possible to indicate the normal eyed (or rather average eyed) children, those with slight defect of vision, and those with more serious defects, and to suggest arrangements for the work of these grades of children according to their fitness. It is likely that an educational arrangement based on a real knowledge of the condition of the children's eyes and the correction of the gross defects at an early age would tend to check the onset of much of the myopia we find developing in later years. Such a proposition may be deemed impracticable in the present state of public finance. The burden of detecting the serious defects of infants' eyes, therefore, rests with the teachers. Infants who squint, even if only temporarily, whose eyes get tired, red, or irritable after work, or who fail to see marks on the blackboard or the details of wall pictures, should be noted and referred to the school medical officer. Similarly children who appear dull or stupid in general class lessons should be referred for examination, for it has been shown that many "stupid" children are stupid from inability to see. These signs of eye-strain should equally be noted by the teachers in other departments and reported.

The Measure of the Work to be Done.

The data given above, obtained by the objective examination of the eyes of infants at a good class school, show that 16 per cent. had serious defects that needed medical attention. Certain of the children with less serious defects will also need attention, let us say these will bring the total to 20 per cent. In London, with an average roll of 725,000 children, the average number of entrants in any year is 63,000, so that the minimum number of children requiring attention each year would be 12,600. To this must be added the number likely to require re-examination, who are about one-fourth of that number for any one child-year, or, let us say, for the several years of school life, a number equal to the entrants examined, making a total of 25,000 examinations each year. London school population numbers about one-seventh of that for England and Wales, so that the grand total on a low estimate will be about 176,400 for each year. The actual numbers of children attending London school clinics as fresh cases during the years 1912 to 1920 inclusive were: 16,670, 21,464, 25,952, 25,286, 26,905, 27,062, 26,200, 28,011, 29,887, making an average for the nine years of 25,400.

Treatment of Defects.

It should be premised that any arrangement made for the treatment of eye defects in children should be in close relation with the schools, so that the results of the treatment may be available for the guidance of the school authorities. Many of the defects found are not completely susceptible to full correction, and the remaining defect may be one that requires special arrangements for the satisfactory education of the child. If the arrangements for treatment are not made with this close relation to the work of the school, a large part of the benefit of the treatment may be lost. When school clinics are provided by the education authorities there is no difficulty in making the desirable connexion; and it does not appear impossible to secure a like conveyance of the necessary information when the child is treated independently of these arrangements by the private practitioner of the parents' choice.

Arrangements for School Clinics.

These will differ in town and country. In towns where there are large aggregations of children it is easiest and best to plan definite clinics in suitable places which may serve a number of schools. In small towns satisfactory schemes are now in working whereby the local practitioner competent in ophthalmic work receives the children who are to be examined in his own house; the arrangement is economical, since it avoids the expense of setting up an independent clinic for a relatively small number of children. In the country these plans will be unsuitable, as schools may be far apart and the numbers in each may be small, so that a clinic could not be economically arranged to serve a given area. In the country, therefore, treatment is best carried out in the school premises by doctors who attend the schools in rotation on a plan prepared by the chief school medical officer. The apparatus needed by the doctor can be readily transported from place to place. The provision of a room suitable for ophthalmoscopic examination is not a matter of difficulty; any room that can be darkened and in which a suitable lamp can be provided will meet the need. Where electric light is in use a focus lamp appropriate for the particular current of the district,

with a length of flexible wire, is all that is needed; where gas is used the incandescent mantle provides a most satisfactory source of light, provided the bracket to which it is attached is placed low enough. Where there is no fixed source of light supply illumination can be best provided by a portable acetylene lamp, of which there are many good patterns on the market. In towns, clinics will be arranged either on hospital premises, if these are conveniently situated, or at independent centres where these facilities are absent.

About 2 per cent. of children in the schools suffer from blepharitis and conjunctivitis. In many of these the need is for regular and efficient cleansing. In town areas this is best met by the establishment of "minor ailment centres," where, under the control of a medical officer, there is a staff of nurses who give daily attention to the cases. It is desirable that where these centres are established they should be definitely linked up with the centres where the more detailed investigation of defects is carried out. Some of these cases of sore eyes are aggravated or caused by defects of refraction, and unless these are recognized and corrected there is no real likelihood of the surface irritation being checked. In country districts the care of such cases can be best met, in the absence of any provision of school nurses, by arrangement with local nursing associations, so that nurses could be detailed off to schools at definite hours each day to undertake the cleansing of children with affected eyes, and the application of the treatment ordered by the visiting doctor.

Following-up.

Examination of school clinic papers shows that even where there are satisfactory arrangements for the following-up of children under medical treatment, the treatment or a continuity of treatment is often neglected. If this be so where there are efficient arrangements, how much more must be the loss where these arrangements do not exist or are elementary! It is desirable that some arrangement should be instituted whereby cases that need regular observation at stated intervals may be marked and reported to the school medical officer, so that the continuity of treatment and observation can be secured even when the child is removed from one area to another.

Provision and Repair of Spectacles.

In towns where clinics are established arrangements should be made whereby an optician attends at the clinic to fit spectacle frames to the children. This plan has many advantages over the plan of sending the children to the optician. When the former plan is adopted there is personal communication between doctor and optician, corrections and adjustment of frames are expedited, and, further, the time of the parents is saved materially. In country districts where the numbers are few the selection of frames should be done by the medical officer himself. He should be supplied with a set of half a dozen standard frames with which he can ascertain the proper fitting for each child, and to the form of prescription he should add the number or description of the chosen frame.

Some difficulty arises in the provision and repair of glasses owing to inability of parents to pay at the time of ordering the glasses. It does not seem desirable that these should be provided free of cost to the parents. When this is done there is a tendency to lack of care in their use, but when they are paid for by the parents much more care is noticed. If the parents of children who are found to have eyes that will need the regular use of glasses during school life could be invited to join a provident scheme into which they could pay regularly small sums to meet the cost of glasses and their repair, the difficulty would be met. Great saving of time would be effected through such a scheme, and particularly if local opticians came into it. At present children who need glasses badly are often without them for long intervals while funds are being raised and repairs made in distant workshops. In country districts a postal service for the supply and repair of glasses will be needed.

The care of spectacles may be materially advanced by a routine parade of all children wearing them, at stated intervals. It should be a duty of the head teacher to supervise the parade, and it would be advantageous if one of the teachers who had some mechanical aptitude were to undertake those small adjustments of bent, tight, or loose frames which add so much to the comfort of the wearers. This plan has been adopted in some large schools with excellent results.

Staff.

There will need to be variations in arrangement according to the type of district in which the work has to be done. Identical arrangements will not fit town and country. In general it may be said that there are advantages in separating the work of school medical inspection from the treatment of children found to be defective.

(1) The assurance provided by the independence of the two officers provides against objections by parents who resent the allegation that there is a defect in their child; it gives a certainty to the finding that is conformable to that which we demand for our own children and indeed for our own persons. (2) Medical inspection involves a sound all-round knowledge of children's physique, and it is not to be expected that a medical inspector with this full general knowledge will be also equally competent to deal with a number of specialities involved in the treatment of defects. (3) In the case of eye defects there are additional advantages to the community as a whole in arranging that the treatment of the defect should be spread over as wide a personnel as possible. At the present time there are not a sufficient number of practitioners with an expert knowledge of eye work to meet the growing demand. The equipment of an education medical staff to do the work for children is a practical proposition, but if this work be done by practitioners whose sole duty is educational, the services of these practitioners will not be available for the service of the community at large. It would appear, therefore, desirable that the treatment of eye defects should be carried out by private practitioners who give evidence of a competent knowledge of the work and will devote a definite part of their time to it. Such an arrangement would foster the supply of a rapidly increasing number of capable practitioners who would have a knowledge of the particular difficulties and dangers of eye defects in industry by their daily contact with the adult population, and therefore be the better able to advise on the education of the children and indicate that line of training which would best fit them for a lifework in view of the defects which may be present.

Since the work of a school eye clinic is so largely refraction work the one test of competency for the practitioner in these departments is the mastery of the retinoscope and ophthalmoscope. The practitioner must have such a mastery of retinoscopy as will enable him both to work out every detail of the refraction with the mirror and to judge from his results what are the most appropriate glasses to order in any given case. He must be able to make his observations with reasonable speed, for the examination is tiring to children. Subjective tests are of little or no value for children and should serve only as a record of visual acuity under certain conditions.

The appointing authority cannot itself test the competency of candidates for the work, but it can and should require evidence of recent and sufficient work in the ophthalmic department of a teaching hospital or of private work over a sufficient period.

It is desirable that country school circuits and independent town clinics should be linked up with some central clinic under the charge of an experienced ophthalmic surgeon for the purpose of consultation or reference for special examination of difficult cases. Where a school clinic is established on the premises of an existing hospital special arrangements for these purposes are unnecessary, as they are made by the hospital staff. In other clinics there may be no such arrangement for consultation, so that the practitioner in charge of the clinic loses necessary assistance, and the best line of treatment for the children cannot always be secured. The establishment of such central clinics at existing hospitals would have an advantage in facilitating in-patient treatment and operation where such were needed. The officer of the local clinics should be at liberty to refer any case of difficulty for consultation, and should be specially invited to refer those cases where visual defect cannot be satisfactorily corrected and where no certain cause explains the failure, serious defects likely to handicap the child's education, cases where special educational methods appear necessary, and cases requiring extended treatment and operation.

Arrangements for Special Treatment.

A small percentage of the children suffer from disease of the eyes which are of a chronic order and connected with some general disability or defect in hygiene, such as chronic conjunctivitis, blepharitis, relapsing ulcer of the cornea, and syphilitic and tuberculous inflammations of the eyes. The danger to the eyes which these diseases present is such that treatment to be adequate must be so organized as to be immediate and continuous and therefore institutional. Treatment in clinics and out-patient departments of hospitals does not meet the need. The hygienic conditions of the child cannot be touched by such

measures. Further, unless the child is under complete control during the treatment, intermissions are likely to occur, and in just those cases where the danger is greatest. Arrangements should be made for the immediate report of such cases to the consultative clinic, the officer of which should be able to recommend the admission of the child to a suitable institution where the treatment may be carried out.

One of the difficulties in carrying through continuous treatment of this sort for a necessary period lies in the intervention of capricious parents, who cannot be brought to understand the seriousness of the conditions. It is worth considering whether this difficulty might not be met by the routine reporting of these cases as they arise to the local magistrates to whom fall the decision in school cases, so that their assent to treatment for a specific period might be obtained in advance. If the parent does not enter into some engagement, or the retention of the child be not obtained by other means, the success of the treatment may be prevented by the untimely withdrawal of the child, so that the heavy expenditure is wasted, the damaging effects of the disease are not prevented, and a permanent disability may follow.

Children with Serious Defect of Vision.

There are a number of children, averaging about 2 per 1,000 of the school population, whose vision is too bad for them to take advantage of the ordinary curriculum. Special arrangements are made for their education under the provisions of the Education Act of 1893. Difficulties arise in these cases on three counts: (1) The insufficiency of the provision for their education, (2) the occasional objection of parents, (3) the lack of general knowledge on the part of medical practitioners of the nature and reason for special provision for these children.

(1) The number of schools for the blind in the country appears sufficient. But despite the sufficiency there are found even to-day cases of young people who are blind within the meaning of the Act, and have been so for many years, and yet whose education has been "attempted" in ordinary schools. Cases such as these indicate a defect in the arrangements for reporting the findings of medical examinations and treatment, and point to the necessity for effective consultation arrangements as indicated above. It is imperative that these children should be provided with satisfactory educational treatment at the earliest possible age. Delay means a serious and irrecoverable loss to the child, and a far more expensive and prolonged training after school years to put them in the way of a satisfactory occupation. The provision for children with less serious defects of vision is less ample. It is being met in the towns where the numbers make it possible to provide special accommodation. This is best provided by the formation of small classes—"myope classes"—in the ordinary elementary schools, so that the children may remain associated with the normal children for part of their curriculum. There is a distinct disadvantage in providing for them in blind schools or in other independent centres, for segregation is likely to cause them to be thought more nearly akin to blind children than to the sighted, and therefore to handicap their start in life. In villages the needs of these short-sighted children may best be met by allowing them to remain in the ordinary schools, provided the teachers are informed of the nature of the defect, and of the prohibition of reading and writing except by methods in use in the myope classes.

(2) Parents who cannot be persuaded of the seriousness of the defects of their children's eyes sometimes evade the acceptance of proper provision by transferring them to private schools, where the nature of the defect may be unknown and unprovided for. Later, when the seriousness of the defect is realized, the children are once more referred to the education authority, and often at a date too late effectively to meet the needs of the children.

(3) Occasionally difficulties arise from a lack of knowledge of the meaning of educational blindness on the part of medical practitioners, so that a conflict of opinion as to the proper training of a defective child arises between the school doctor and the private practitioner. The more widespread the association of those engaged in these two branches of medical work the less will be difficulties of this sort; hence the advantage of associating as many private practitioners as possible with school medical treatment.

The Influence of School Medical Work on the General Community.

School work should not be considered in relation only to education as carried on in the schools. It is true that the primary object of the work is to prevent eye-strain, the aggravation of eye defects, and to remove a handicap that would diminish the value of education to the child. But there are other values. The lessons that are learned in school life are a preparation for the wider life of the community. And in some degree the inculcation of a sound system of treatment of eye defects of the school children will react upon the whole community. There is much industrial inefficiency caused by ignorance and negligence of eye defects; when the knowledge of the necessity and possibility of the correction of these defects is widespread the gain will be great. Parents are learning this lesson through the work done by the school medical service, and a new generation of parents will have learned the lesson by practical experience.

SOCIETY FOR RELIEF OF WIDOWS AND ORPHANS OF MEDICAL MEN.

THE annual general meeting of the Society for Relief of Widows and Orphans of Medical Men was held on May 18th at the offices of the Society, 11, Chandos Street, Cavendish Square, with Sir ALFRED PEARCE GOULD, President, in the chair.

The following report for 1920 was adopted:

Report for 1920.

Since the last report 11 new members have been elected and 6 have been lost owing to death and resignation. The Society consists at the present time of one honorary, 163 life and 137 ordinary members, making a total of 301. The annual subscription for a member who at the time of his election is under 40 years of age, is two guineas, if over 40 but under 50 three guineas, and if over 50 four guineas. There are special terms for life subscription.

The invested capital now stands at £144,250. By the By-laws only the income may be used for the payments granted for the relief of the widows and orphans eligible to receive grants. All life subscriptions and legacies are funded. The income from investments amounted to £4,682 5s. 2d., £373 2s. 1d. was received from subscriptions and donations, making a total income of £5,055 7s. 3d.; the working expenses were £299 7s. 6d. During the year two widows came upon the funds and three died. The sum of £4,584 was distributed among the annuitants of the charity. On December 31st there were fifty-two widows and six orphans in receipt of grants.

The Society, which is one of the richest of its kind in the United Kingdom, was founded in 1788, and incorporated by Royal Charter in 1864. Membership is open to any registered medical practitioner who at the time of his election is resident within a twenty-mile radius of Charing Cross. Should a member remove anywhere outside the radius, even beyond the British Isles, he nevertheless remains a member of the Society, provided he has conformed to the By-laws. Relief is granted to the necessitous widows and orphans of deceased members of three years' standing and of life members.

At the present time the widow of such member who has an income of not more than a hundred pounds a year receives a grant, voted each half-year by the Court of Directors, at an average rate of £50 per annum, paid half-yearly in advance, and each orphan, up to the age of 16, receives a grant of £43 per annum. An orphan, on attaining the age of 16, by the By-laws of the Society ceases to be eligible to receive grants from the ordinary funds of the Society. There are, however, two special funds from which the Court of Directors can make grants to orphans after the age of 16, and special grants from £25 to £10 are made to widows.

The acting Treasurer drew attention to the fact that the working expenses of the charity were about 5 per cent. of the total income, which he considered most satisfactory.

A cordial vote of thanks was passed to the editors of the various medical journals for their courtesy in publishing notices of the Society from time to time.

Further particulars may be obtained on application to the Secretary. The next election of members will be on July 6th, 1921.

THE last quarterly return of the Registrar-General shows that 129,263 deaths were registered in England and Wales during the three months ended March 31st, 1921. This corresponds to an annual rate of 13.9 per 1,000 total population in 1920; it is the lowest rate recorded in any first quarter since the establishment of civil registration. Influenza was stated to be either a primary or a contributory cause of death in 3,235, or 2.5 per cent. of the total deaths registered last quarter. Of the 209,667 births, 9,505 were illegitimate. Infant mortality, measured by the proportion of deaths under one year of age to registered births, was equal to 101 per 1,000, being 17 per 1,000 below the average in the ten preceding first quarters.

FROM August, 1919, to March, 1921, 66 persons received prophylactic treatment for rabies at the Utrecht serological institute, 19 were treated in 1919, 39 in 1920, and 8 in 1921; the disease did not develop in any case. During the same period the animals in Holland attacked by rabies consisted of 1 horse, 4 cows, 41 dogs, and 1 cat. The cases all occurred exclusively in the four provinces of Groningen, Drenthe, Overijssel, and Gelderland.

British Medical Journal.

SATURDAY, MAY 28TH, 1921.

PRE-NATAL DEATH.

THE third Sir John Struthers Lecture, which was delivered before the Royal College of Surgeons of Edinburgh on December 17th, 1920, has recently[1] become available in print. The lecture was by the Professor of Anatomy in the University of Edinburgh, and was worthy of Professor Arthur Robinson's high reputation. The subject was pre-natal death, a matter about which not a little has been written in recent years; but the pre-natal death referred to was not that commonly meant, and the term was used in a sense that differed widely from its accepted obstetrical employment.

By pre-natal death Professor Robinson means a sort of normal or necessary extinction of life due to the fusion of certain gametes (ova and spermatozoa) which, though in themselves quite healthy, yet by their union produce zygotes which have either no vitality to carry them further or only sufficient to take them a short distance or in a tattered condition along the path of ante-natal life. The zygote or impregnated ovum resulting from the meeting of certain ova and spermatozoa which from the point of view of persistent vitality must be called germinally incompetent or incompatible, is a weakling or a failure, and its failure is followed by an abortion which Professor Robinson calls "normal"—using the word "normal," however, in a rather special sense. With some other ovum such a sperm might give a living and a lively zygote, and similarly some other sperm might prove competent enough with the defaulting ovum; there is, in other words, an incompatibility at the moment of impregnation; the destined ovum is not met by the delegated spermatozoon, and so the zygote falls or can only stagger for a few paces along life's highway. To apply Augustine of Hippo's old phrase in a new fashion, the zygote comes into being carrying with him his own mortality (*circumferens mortalitatem suam*).

In coming to this conclusion that in a certain percentage of all germinal conjunctions there is this incompatibility with resulting mortality, Professor Robinson has been influenced by a series of observations he has made upon horses and mares (Clydesdales and thoroughbreds) and upon ferrets. By finding the ovum-extrusion rate and comparing it with the actual birth rate in these animals, he reaches what is termed the "pre-natal death rate." In the Clydesdales it varied from 46 to 50 per cent. and in the thoroughbreds from 52 to 62 per cent.; in the ferrets it was not more than 39 per cent. and was most likely about 35 per cent. A pre-natal death rate (as above defined) is not peculiar to horses and ferrets, but occurs in other animals, amongst which swine, rabbits, guinea-pigs, and Dasyurus (among the marsupials) are mentioned, as are likewise birds. Professor Robinson, therefore, asks himself the question, Why not also in the human subject? It should be mentioned that he took great care to avoid the intrusion of certain obvious fallacies; the parent animals were healthy, their environment was as usual, the food was not altered, and there was no evidence that there was excessive use of the male. Neither could the pre-natal deaths be due to the "internal environment," the immediate surroundings in the genital organs, for dead and normally developing ova and young zygotes were found in the same passages; indeed, in the ferrets a dead zygote or a degenerate zygote was frequently situated between two normal zygotes. Professor Robinson is therefore justified in asking, Why not also in the human subject? If this question be answered in the affirmative, we have to ask whether any change for the better in the surroundings of the expectant mother or in her health can increase the birth rate?

At this point great care must be taken to make sure that like things shall not be compared with unlike. Professor Robinson's "inevitable pre-natal death" (although even here the word "inevitable" is scarcely permissible) is not to be confused with the avoidable stillbirth due to the use of high forceps when Caesarean section or the induction of premature labour ought to have been employed. Neither is it within the same category as abortion due to parental syphilis and preventable by the use of the salvarsan substitutes and mercury. It is possible to agree with Professor Robinson that some sterility is "normal" and unavoidable and that some pre-natal death is also "normal" or usual, and under ordinary circumstances cannot be avoided, without assenting to the "better dead" argument that we shall abandon all efforts to save ante-natal lives and to prevent sterility. The lecturer was careful to point out near the close of his most interesting address that he was not then concerned with the remaining and avoidable part of pre-natal mortality, but a special word of caution is needed in respect of Professor Robinson's conclusion that the condition of the uterine mucous membrane associated with normal abortions is not degenerative or diseased, but normal, and that treatment of it is not only unnecessary, but may probably be detrimental. It can only be after a careful process of exclusion that the diagnosis of a "normal" abortion can be made, and until that has been reached it would be unwise to rule out uterine curettage, which has often been followed by the birth of a full-time child after one or even more abortions. Of course other means of treatment are not to be neglected.

Professor Robinson frankly admits that the human "normal pre-natal death rate" cannot at present be fixed; but he thinks that about half of it may be regarded as due to causes which, in a sense, are unavoidable, and therefore as not remediable by any treatment, local or general, of the mothers. He does not, however, make it plain that the type of pre-natal death to which he refers occurs possibly, if not probably, very early in ante-natal time, soon after, if not actually before, the date of the first missed menstrual period. His "normal" abortions, therefore, may be amongst those which, by their early incidence, escape the statistician and do not come under the treatment of the obstetrician. Professor Robinson's observations and conclusions do not, in fact, afford the obstetrician any excuse for relaxing his efforts to prevent miscarriages or for abandoning his efforts to save ante-natal lives. There is, however, the necessity, in forecasting the probable percentage of ante-natal lives which are capable of being saved by hygiene and treatment of expectant mothers, to make allowance for the pre-natal mortality which, in the present state of our knowledge and of our therapeutic means, is fitly to be described as inevitable. There are still many lives which fall to the child welfare physician to save, and the time is not yet

[1] *Edinburgh Medical Journal*, March and April, 1921, pp. 137-151, 209-231.

when, with all these safely carried on to birth, there shall remain no others except the zygotes inevitably foredoomed to extinction. Even in respect of these last it has yet to be shown that good hygiene among the parents, spread over several generations, may not diminish the number of the failures.

THE TYPHOID CARRIER.

THE typhoid carrier problem, about which so much has been written, is brought once again before us by Dr. William Travis Howard, jun., in a valuable study of the history of enteric fever in Baltimore during the last seventy years.[1] We may first refer to some of the more general features of his paper. Although the mortality attributed to this disease at Baltimore is still greatly in excess of that observed in English urban aggregates (the rate in 1919, corrected for non-residents, was 6.28 per 100,000, which may be compared with 1.4 for London, 1.5 for county boroughs, 1.6 for other urban districts, and 1.5 for rural districts), it has declined greatly in the last fifty years, having been nearly 100 per 100,000 in 1870 and over 70 as recently as 1890. Down to the year 1881 opportunities for the pollution of the water supply were abundant, but by that date great improvements had been effected, and, with the exception of a few years following the incorporation of new districts into the city, the typhoid curve descended for twenty years. After 1901 fresh pollutions of the water became abundant and the curve tended to rise until, after chlorination of the supply in 1911, a sharp descent began.

During the whole period between 1851 and 1894 conditions were very favourable for the pollution of milk. Much was obtained from cows kept in the city in circumstances appropriate for contamination by actual sufferers from typhoid or "carriers," while the milk was heavily watered from polluted wells and springs. After this period matters improved. The urban cow was to a great extent driven out, and the municipal authorities gave effect to the advice of their medical officers. A revolution in the control of milk supply followed the enforcement of ordinances in 1908 and 1912, the Health Department acquiring control of dairy farms outside the city. Yet, as late as 1917, nearly 8 per cent. of the reported cases were traced to milk. Dr. Howard remarks that unless milk bottles are uniformly sterilized as a matter of routine, bottled milk may be, during the prevalence of typhoid, more dangerous than milk served from the old-fashioned churn. "When milk is sold from the churn or can, the purchaser receives it in his own container, and the dairy takes nothing infected away from the householder."

The Baltimore authorities seem to deal drastically with "carriers"—in fact, to "apprehend" them. Whether the causal nexus established between the alleged carrier and the outbreak would usually satisfy Dr. Hamer is, perhaps, open to doubt. We will quote one of Dr. Howard's examples. It is that of a family in which, during a period of seventeen years, four outbreaks of typhoid in three generations had occurred. "The grandmother had contracted the disease seventeen years before; the next year her two sons, her son-in-law and daughter and an unmarried daughter, all living in the same house with her, developed typhoid fever. In June, 1916, this woman's grandchild, aged 7 years, who lived in her house, developed the disease. On January 2nd, 1917, a second grandchild, a sister of the first, was reported as a case of typhoid fever. The whole family was cultured on January 8th, 1917, and the grandmother, the unmarried aunt, and the child who had had typhoid fever in June of the previous year, were all three found to be carriers."

The sequence is impressive, but some of Dr. Howard's arguments are not quite convincing. He instances the case of a coloured cook found "to be a carrier responsible for 9 cases of typhoid fever among college girls, and who appeared to be quite frank when submitted to the closest interrogation was unable to recall a febrile illness suggestive of ordinary clinical typhoid fever. She described, however, very clearly the symptoms of an attack of acute cholecystitis which she had had about a year before. . . . Had she not by chance transferred typhoid infection to a number of college girls at the same time, she would probably not have been apprehended. Upon such chances as these the transmission of this disease and the recognition of its mode often depend. None of this woman's personal associates gave a history of frank typhoid fever either before or after her attack of cholecystitis. . . . A large proportion of the several hundred food handlers whom I have had cultured with negative results may be intermittent carriers, infecting from time to time people not intimately associated with them." This reasoning amounts to the following: A. has access to the food supply of B., C., D., E., etc.; B., C., and D. develop typhoid fever, and A. is found to carry the typhoid bacillus; *therefore* A. has infected B., C., and D. If A. is not found to be infected, he may be an intermittent "carrier" and still responsible. As a matter of administration, to segregate A. in the former and to keep an eye upon him in the latter case are plainly correct courses; but the logician will certainly say that what has been shown is not causation but correlation, and that if, as Dr. Howard hints and others have hinted, the carrier state is extremely common, then the argument from correlation is not so impressive as it appears.

The whole point of such sequences as that of the grandmother and her descendants, and of the negro cook and the college girls, depends upon the assumption that the odds against the mere fortuitous concurrence of half a dozen cases of typhoid and the presence of a carrier are enormous. In our opinion, that assumption may be safely made, and the carrier assigned a definite and not unimportant part in the etiology of typhoid as a sporadic or minor epidemic disease. To go further and to see in the carrier *the* prime factor of dissemination of typhoid would be unwarrantable, and we think that the following words of Dr. Howard have more than local application: "Now that the City Fathers, after many years of fumbling, have finally made those general sanitary provisions necessary for the reduction of the incidence of typhoid fever to a comparatively low level, in the old twenty-four wards, and the obvious may be set to one side, the public health administrator of an inquiring turn of mind may turn himself to the much more interesting and important problem of determining the less obvious or hidden means of transmission of the disease."

[1] *Johns Hopkins Hospital Bulletin*, vol. xxxi, Nos. 354-5, August-September, 1920.

ADVANCED LECTURES IN LONDON.

ANNOUNCEMENTS recently made by the University of London of advanced lectures on medical subjects illustrate an improvement that is quietly being made in the facilities for advanced medical students and visitors to London. The lectures are specially addressed to the former, but they are open to others interested in the subject without

fee or ticket. All the courses, with one exception, are given by teachers in London medical schools; the one exception is the lecture to be given on June 8th at the house of the Royal Society of Medicine by Dr. H. J. Hamburger, Professor of Physiology in the University of Groningen; the lecture will deal with "permeability in physiology and pathology," and Professor E. H. Starling, C.M.G., F.R.S., will be in the chair. On June 13th Professor F. R. Fraser will begin a course of four lectures at St. Bartholomew's Hospital on digitalis: the first will deal with the principles of the therapeutic use of the drug; the second with its use in the cardiac arrhythmias; and the third with its effect in cases with normal cardiac rhythm; in the fourth lecture digitalis glucosides and allied substances will be described. Four advanced lectures in pharmacology will be given at the Royal College of Surgeons by Dr. Edward Mellanby, Professor of Pharmacology in the University of Sheffield, on June 6th, 7th, 13th, and 14th. The first two lectures will deal with elements of diet aiding and preventing the proper calcification and growth of bones and teeth, and the third with dietetic conditions affecting the development of normal and hyperplastic thyroid glands and the application of the experimental results obtained to exophthalmic goitre. In the fourth alcohol as a food-drug will be discussed. A course of four lectures on recent advances in experimental embryology will be given at the Imperial College of Science, South Kensington, by Dr. E. W. MacBride, F.R.S., Professor of Zoology in the College. The first lecture will be given on June 7th; in it Professor MacBride will discuss the nature of the process of fertilization, artificial parthenogenesis and allied matters; in the second he will deal with the three stages in a normal life-history and the dependence of the formation of organs on the "internal environment." This subject will be continued in the third lecture, which will contain a review of the effects of thyroid extirpation and of thyroid feeding on tadpoles, of the relation of the pituitary to growth in tadpoles, and an analysis of the effects of the thyroid, as seen in Axolotl and perennibranchiate Urodela. The effects produced by the external environment as worked out by Kammerer will then be described, and, finally, the bearing of the results on the theory of evolution will be discussed. Dr. Charles Porter, M.O.H. St. Marylebone, will begin a course of four lectures on recent developments in legislation for the prevention of disease, at University College, Gower Street, on May 30th. The first lecture will deal with the history of the subject, the second with directly preventive legislation, the third with indirectly preventive legislation, and the fourth with legislation of the future. The lectures are given at 5 p.m., except those of Dr. Porter's course, which will be given at 5.30 p.m.

PROTECTION OF RADIOLOGICAL WORKERS.

THE *X*-Ray and Radium Protection Committee, to the proposed formation of which we made reference a few weeks ago, has now been constituted; it has been established to investigate the means of protecting workers with *x* rays and radium from the injurious effects which have been observed, especially those on the skin and blood. The Chairman is Sir Humphry Rolleston, K.C.B., M.D. The members are: Sir Archibald Reid, K.B.E., C.M.G., Radiologist to St. Thomas's Hospital; Dr. Robert Knox, Radiologist to King's College Hospital and the Cancer Hospital (representing the British Association for the Advancement of Radiology and Physiotherapy); Dr. S. Gilbert Scott, Radiologist to the London Hospital; Dr. Stanley Melville, Radiologist to St. George's and to the Brompton Chest Hospitals (representing the Electro-therapeutic Section of the Royal Society of Medicine); Dr. Harrison Orton, Radiologist to St. Mary's Hospital; Mr. Cuthbert Andrewes (representing the Röntgen Society) Professor S. Russ, Physicist to Middlesex Hospital (representing the Institute of Physics); Dr. G. W. C. Kaye, O.B.E. (representing the National Physical Laboratory); Dr. J. C. Mottram, Pathologist to the Radium Institute. Dr. Melville is acting as honorary secretary. The Committee held a preliminary meeting on May 18th at the house of the Royal Society of Medicine. The Committee has appointed a subcommittee to draw up a short statement on the means for the protection of the worker, giving advice as to the position of *x*-ray rooms, their ventilation and cubic space, and on the need for making and observing rules governing the hours of work, outdoor exercise, and holidays of workers. It is hoped that this statement may shortly be issued as a leaflet. The Committee intends further to collect data bearing on the effect of irradiation with particular reference to protection; to carry out special research, if necessary; to act in a consultative and, possibly, advisory capacity; and to publish reports from time to time.

RESEARCH IN RADIO-THERAPEUTICS.

A SCHOLARSHIP has been founded at the Manchester Royal Infirmary primarily for the investigation of the claims made, especially in Germany, for the intensive *x*-ray treatment of cancer. The anonymous donor, however, desires that the inquiry shall include the study of the cancer problem from any point of view that may arise, and also an inquiry into the precautions that should be taken for the protection of persons working with highly penetrative rays. The scheme under which the scholar will work has been framed by a committee, consisting of Sir William Milligan, Professors H. R. Dean and W. L. Bragg, Dr. A. Burrows, Dr. Powell White, Mr. James Watts, and Dr. A. E. Barclay. Dr. C. C. Anderson has been appointed the first scholar, and will visit various centres where the intensive method is in use. He will then return to Manchester to carry on the investigation in collaboration with other workers, who will attack the problems arising from the pathological and physiological standpoints. It is intended that the first visit should be made to Erlangen, but if time permits the scholar will afterwards visit Freiburg, Berlin, and Mannheim, and certain centres in France, Holland, and Sweden.

COLONEL WILLIAM HUNTER, C.B.

ON Friday, May 20th, at the Imperial Restaurant, a complimentary dinner was given to Colonel William Hunter, C.B., M.D., in recognition of his scientific work, especially in regard to preventive medicine. It was felt by his colleagues and professional friends that Dr. Hunter's retirement from the active staff at Charing Cross Hospital formed a suitable occasion to express their appreciation both of himself and of his work. The dinner was presided over by Mr. George Verity, chairman of the governing body of Charing Cross Hospital, who was supported, in addition to the other speakers, by Sir Arbuthnot Lane, Sir Frederick Mott, Sir Herbert Waterhouse, Mr. Walter Spencer, and a large company. The chairman spoke of the affection and admiration felt for their guest by all who knew him. He referred, with a layman's diffidence, to some of the landmark's in Dr. Hunter's career—his researches in diseases of the liver, his discovery of the importance of oral sepsis, his labours in freeing the Serbian army of typhus, and his work as President of the War Office Advisory Committee for the prevention of epidemic diseases in the Eastern war areas—and expressed the regard felt for him by all who had been associated with him during his many years' service at Charing Cross as Physician and Dean, and also as historian of the Hospital and Medical School. Sir Thomas Barlow said that a man who had done what William Hunter had done should be told by his friends and colleagues what they thought of him, and of his gift to humanity. In his pioneer work on pernicious anaemia, its prevention and arrest, he took the true scientific line;

he grappled first of all with causation, knowing that treatment would follow from study of the natural history of the disease. In attacking the problem of typhus in the East, he concentrated his efforts on lice, the carriers of infection, applying fresh knowledge to new and difficult conditions. They were proud to think that all this work had been done by a general hospital physician. Dr. William Hunter, in replying to the toast of his health, made a modest and charming acknowledgement of the tribute paid him by his old friends and colleagues. He expressed the regret with which he gave up his work at Charing Cross after a quarter of a century. Touching briefly on his war experiences between April, 1915, and December, 1919, he spoke of the loyal support given by his bacteriological colleagues and his good friends the Serbians in overcoming typhus. As he read it, the lesson of his war work was that prevention must be grasped as a whole. Sir James Galloway, in proposing the toast of "The Visitors," added a word of genial appreciation of "Willie Hunter" on behalf of the staff of Charing Cross. This note was echoed by Sir William Hale-White, who said that praise from the brethren of one's own profession, those who knew and understood, was the only praise worth having. Sir Humphry Rolleston, who also responded, preferred to regard himself as an honorary host rather than as a visitor. For very many years he had admired the whole-minded way in which their guest pursued his aims, and these included all branches of preventive medicine. The health of the Chairman was proposed by Sir John Bland-Sutton, who sketched in bold outline the qualities needed for a good hospital chairman, and in so doing described Mr. Verity.

THE AMERICAN MEDICAL ASSOCIATION.

THE annual meeting of the American Medical Association takes place this year at Boston, Massachusetts, from June 6th to June 10th, and it is expected that nearly 10,000 persons will visit Boston in connexion with the meeting. Special trains and special railway fares from all parts of the United States have been arranged for members of the Association who are attending. The different scientific sections are to meet on June 8th, 9th and 10th. The Sections on the Practice of Medicine; Obstetrics, Gynaecology and Abdominal Surgery; Laryngology, Otology and Rhinology; Stomatology; Pathology and Physiology; Nervous and Mental Diseases; Urology; and Preventive Medicine and Public Health will hold their meetings during the mornings. The Sections on Diseases of Children; General and Abdominal Surgery; Ophthalmology; Miscellaneous Topics; Pharmacology and Therapeutics; Orthopaedic Surgery; Dermatology and Syphilology; and Gastro-enterology and Proctology will meet during the afternoons. On June 6th and 7th a series of special clinics have been arranged in the Boston hospitals. In connexion with the scientific exhibition, it has been suggested that many subjects presented before the sections in papers could, if there were time and opportunity, be demonstrated by specimens, material, instruments, apparatus, charts and the like, or by lantern slides, or "moving picture talks," and it is proposed that the authors should be encouraged to supplement their papers with exhibits. If the exhibit is movable it may be taken to the meeting place of the Section at the time of the reading of the paper, and then returned to its place in the Exhibit Hall. The exhibits have been arranged in three main divisions—medicine, surgery, and pathology. It is pointed out that "still" exhibits are of little value; what is desired are personal demonstrations or explanatory talks by someone who is interested in, and can teach, the subject. The *Journal of the American Medical Association* remarks that the primary object is to bring to the minds of the profession attending the meeting a knowledge of the newer things in the progress of scientific medicine, and thus not to limit the presentation of such subjects to the comparatively small groups of physicians or surgeons attending a particular section. In addition to the scientific work which is to be carried on at the Boston session there are many social features, while the fact that the Pilgrim Tercentenary takes place at Plymouth (U.S.A.) immediately after the close of the scientific meeting suggests that it will be attended by many members of the association.

MEDICAL INSURANCE AGENCY.

A MEETING of the Committee of Management of the Medical Insurance Agency was held at the house of the British Medical Association, 429, Strand, on May 12th, when the chairman, Dr. G. E. Haslip, presented a report on the working of the agency for the year 1920. There had been, he said, substantial progress in all classes of insurance, including a large increase in the life business. Special pains were taken to arrange policies of life insurance suitable to the needs of medical practitioners. Children's policies, either in the form of thrift policies or educational endowments, appealed, it was found, strongly to the profession. Business in motor car insurance was done both with the tariff offices and in respect of a special doctor's policy granted by Lloyds' underwriters. Though the amount of business was satisfactory, it was felt that it might easily be larger were the advantages offered by the agency better known. During the year the sums returned by way of rebate to those holding policies of various kinds through the agency amounted to £1,453, or £493 more than in 1919. This is a direct saving to the insured, and since the agency was founded, in 1907, the sums saved to the profession have amounted altogether to well over £9,000. The expenses of the agency show an increase of £158, due in part to the increased cost of printing, postage and stationery, and in part to the salary now paid to the clerk to the agency. After allowing for the rebates and agency expenses the balance-sheet, certified by the auditors, Messrs. Price, Waterhouse and Co., shows a surplus available for distribution among medical charities amounting to £1,959. At intermediate meetings held in May and December, 1920, grants amounting to £1,015 were made to medical charities, leaving an unallotted balance of £976. It was now resolved to make grants of 300 guineas each to the Royal Medical Benevolent Fund, the Royal Medical Benevolent Fund Guild, and Epsom College Benevolent Fund. The objects those who founded the agency placed before themselves were, first to assist medical men to insure against various risks on the best possible terms, and secondly, to use part of the commission earned by the agency to help medical charities. Both objects have been attained. As a result of the distribution this year the total sum paid to medical charities by the agency since its foundation is £7,380. Mr. W. E. Warne, who has been agent and secretary since the death of Mr. Guy Elliston (who was one of the founders), is retiring, but the agency will continue to have the advantage of his experience, as he has accepted a seat on the Committee of Management. Mr. P. N. Adamthwaite, who has worked in the office of the agency for some years, has been appointed agent.

THE BIRTH OF EDWARD VI.

CAESAREAN section takes its name, of course, from the reputed birth in this manner of Julius Caesar, but the operation is of still more ancient origin. Pliny, in mentioning it, says that Scipio Africanus (B.C. 237) was so born, as, according to Ovid, was Aesculapius. There is in England a persistent tradition, supported by contemporary ballads, that Queen Jane Seymour, the third queen of King Henry VIII, was delivered by Caesarean section of the prince who became King Edward VI. The story is told, and the evidence sifted, in an interesting article by Dr. S. D. Clippingdale, in the spring number (Vol. xxviii, No. 1, New Series) of the *Journal of Obstetrics and Gynaecology of the British Empire*, although he arrives at no definite conclusion as to the truth or otherwise of the tradition. Queen Jane was approaching her thirtieth

year when the confinement occurred, on October 12th, 1537, at Hampton Court, and she died twelve days later. There is a story, not unsubstantiated, of how when it was explained to him that, owing to the protraction of the labour, an operation was necessary—the choice apparently lay between craniotomy and Caesarean section—the King replied: "Save the life of the child, for another wife can easily be found." This sentiment may have been influenced by State policy, but it does not to modern ears compare favourably with Napoleon's in like case: "Save both lives if you can, but if you cannot save both lives, save the life of the Empress." Early on the day of her death a certificate was sent to the Privy Council, signed by three apothecaries and three Court physicians, reporting that "Yesterday afternoon she"—the Queen—"had a natural lax for reason whereof she began to lighten"—this perhaps indicates the presence of peritonitis—"and (as it appeared) to amend and so continued till towards night. All this night she hath been very sick and doth rather appare than amend." There is no mention of operation in this report or in a letter which the Queen addressed to the Privy Council, two days after her confinement, to announce the birth of a prince, and evidently the Queen progressed well for at least a week, when her condition took an unfavourable turn. Dr. Clippingdale suggests that on the removal, after eight or ten days, of the wrappings with which the patient had been swathed, septic peritonitis may have been induced. Whatever was the actual cause of death, however, the popular belief, as shown by the ballads quoted in the article, was undoubtedly that it resulted from Caesarean section.

TUMOURS AS MALFORMATIONS.

In a thoughtful article with the non-committal title "Studies on tumour formation," Dr. G. W. Nicholson,[1] Lecturer in Morbid Histology at Guy's Hospital, first exposes the weak points in the current definitions of a tumour, and then asserts that the reason why these definitions break down is that tumours do not differ in any essential character from the other tissues of the body. He maintains that it is only by regarding tumours as aborted organs that their structure, growth, and development can be understood; there is, he argues, no distinction between tumours on the one hand and accessory organs or malformations on the other; thus he holds that the nature of a mammary fibro adenoma is more truly expressed by terming it "a malformed breast," that "giant parathyroid" is quite as good a description as parathyroid adenoma, and that a secondary squamous-celled carcinoma would be more accurately described as "malignant skin." Reversion to the appearances seen during the development of the tissues is a characteristic feature of most tumours; thus the malignant "adeno-sarcoma" of the kidney, not uncommon in early life, habitually recapitulates the normal development of that organ and was rightly entitled "malignant embryonic kidney" by Trappe. To the phenomena characterizing malignancy Dr. Nicholson proposes to devote a future article, and to this we shall look forward, for, after all, the point that chiefly interests the bulk of the profession is how to obviate the harmful effects of tumours, whatever their exact nature may be, and, if possible, to substitute prevention for problematic cure. But to return to Dr. Nicholson's argument: it is often urged that tumours do not perform any function, or, if so, that it is useless; there are, however, many examples with histological evidence of considerable physiological activity in tumours, especially those in connexion with secreting glands; tumours, in fact, do their best in this direction, but as abortive organs, often without ducts, they fall short of success. To define a tumour as autonomous and deriving its nourishment from the body does not distinguish it from an organ such as the liver or from the foetus *in utero*. Dr. Nicholson therefore concludes that in their structure, manner of growth, and functions tumours do not differ essentially from other tissues; they are merely less perfect; they merge into, and indeed are, malformations. Incidentally, Dr. Nicholson declares war on the term "endothelioma" as a convenient category for tumours of difficult classification, and expresses repentance for having described six examples in 1907.

[1] G. W. Nicholson, *Guy's Hospital Reports*, 1921, vol. lxxi, pp. 222–246. London: H. Frowde, and Hodder and Stoughton. 1921. (Med. 8vo, pp. 138–251. 12s. 6d., or £2 2s. per vol. of four numbers.)

THE ANNUAL MEETING AT NEWCASTLE.

The provisional programme for the forthcoming annual meeting of the British Medical Association at Newcastle-upon-Tyne was printed in last week's SUPPLEMENT, together with further particulars regarding accommodation for visitors at Newcastle. Later issues of the SUPPLEMENT will contain the revised programme of arrangements and forms for notification of attendance to be filled in by members intending to be present at the annual meeting. The title of Sir Thomas Oliver's special address on industrial medicine, to be given on Wednesday, July 20th, at 8 p.m., is "Industrial Hygiene; its Rise, Progress and Opportunities." The lecture will be open to those of the commercial and industrial classes who are interested in the subject.

THE MEDICAL CURRICULUM IN GERMANY.

In an opening address delivered to the German medical congress which met in Wiesbaden last month, Professor G. Klemperer of Berlin expressed the view that the economic disabilities under which Germany was labouring—disabilities which were likely to continue—would make it necessary to shorten the medical curriculum. He suggested that in future it would be possible to allot only four terms to what are called in this country the preliminary and intermediate subjects—physics, chemistry, anatomy, and physiology. Six terms, he thought, would be required for the clinical subjects. During the first year of clinical study a medical student should attend a course of practical nursing, and during the two following clinical years should be engaged in practical work in the various hospital departments. After condemning the too great length of vacations, he maintained that by replacing technical and theoretical studies by intensive practical work it would be possible to give up the "practical year" hitherto required after the passing of the final qualifying examination. Under existing economic conditions, he said, the recently qualified student could not afford to spend a year in unremunerative hospital work; this requirement, moreover, was a serious obstacle to early marriage. Turning to more general questions, Professor Klemperer laid stress on the absolute necessity of maintaining free choice of doctor. The relation of doctor to patient was strictly personal, and State control would destroy the highest ideals of the medical profession. Finally, he had a fling at women doctors; he had, he said, no objection to them in theory, but doubted profoundly whether their physical strength would be equal to the exacting demands of medical practice.

DANGEROUS DRUGS REGULATIONS.

The Regulations, dated May 20th, 1921, made by the Secretary of State for Home Affairs, under Section 7 of the Dangerous Drugs Act, 1920, are published in the *London Gazette* of May 24th, but the Report of the Committee which has been advising the Home Secretary on these Regulations is not yet available. We hope to deal with the Regulations and the Report next week.

LORD CAVE'S committee of inquiry into the finances of the voluntary hospitals has held meetings again this week, but it is not expected that the report will be completed for presentation before the end of the month.

Scotland.

ROYAL EDINBURGH HOSPITAL FOR SICK CHILDREN.

SIR JOHN R. FINDLAY, who presided at the annual meeting of contributors to the Royal Edinburgh Hospital for Sick Children, said, in moving the adoption of the annual report, that the expenditure had increased by leaps and bounds, and although the public had responded by increasing their subscriptions the increase was below the increase in expenditure. The hospital had always had to draw upon benefactions in the form of legacies, but the percentage met from this source had gone up at the present time to between 41 and 45 per cent. Edinburgh was perhaps more fortunate than London, where there was a large number of competing hospitals, with comparative lack of personal interest on the part of the public in any particular hospital. Scotland, however, was divided into comparatively small districts, and the inhabitants of these particular districts took a pride and a personal interest in the hospitals which, he thought, would enable them to maintain the voluntary system much longer than elsewhere. What they might hope for was that if any assistance was given to the voluntary hospitals it would not be in a form which would have the effect of undermining the voluntary system. Colonel Newbigging seconded the adoption of the report, which was agreed to. Lord Ashmore, in moving a resolution commending the hospital to the liberality of the public, said that he was struck by the fact that there was a kindly appreciation of the institution on the part of many of the public works, and of one or two of the large co-operative societies.

EDINBURGH UNIVERSITY ROLL OF HONOUR.

It is a melancholy business for the survivors of a generation to peruse the memorial of their fellows who are dead, even though their deaths were glorious and deserving of memory. As we turn over the pages of this volume,* recognizing so many names and so many faces of student days before the war, we realize more poignantly the blight that has been cast upon a whole generation. So many are dead without our having known it, so many are dead whose deaths we knew too well. Edinburgh has always prided herself on being a university for all the world, and on the long roll appear names from every corner of the globe, and from Highland parish schools as well as from Eton and Winchester. Young and old are there together, from the fresher of one term's standing to Sir Hay Donaldson, who was 60 when he was drowned with Lord Kitchener, and Colonel James Clark, K.C., who was killed in action in France at the age of 56. The names of two ladies, both medical graduates, appear —Dr. Elsie Inglis, who died as the result of her memorable work in the Balkans, and Dr. Marian Wilson, who died at Royaumont, in France. The names of famous athletes one expects to find on such a roll as this, but with them in equal honour are the names of men whose field was the laboratory or the study. So, with Bedell-Sivright —the dashing forward of twenty-two internationals—J. L. Huggan, Eric Milroy, Alfred Taylor, J. H. D. Watson, and many another, we have A. D. Darbishire, the brilliant university lecturer on genetics, who was a private in a Highland regiment before he gained a commission in the Artillery, John Handyside, the lecturer on logic and metaphysics, and H. H. Norton, the Wesleyan minister who as an R.A.M.C. private was killed at Gallipoli. There, too, are W. G. Porter—who gained a D.S.O. as an Artillery major—and Denis Cotterill, the surgeons, and G. H. Melville Dunlop, the physician, who would to-day so surely have been carrying on in Edinburgh the tradition of the medical school, while among the undergraduates who have fallen are the honoured names of Bayley Balfour, Cathcart, and Schafer.

On the Roll of the Fallen appear the names of 944 members of the university, with brief accounts of their academical and military careers, illustrated in nearly all cases by photographs, while in the Record of War Service are some 7,000 more names. At first, we believe, it was intended that this Record should include all forms of national service, but various difficulties arose, and as it was realized that such services stood in a different category from services in the field the intention was abandoned. It may be regretted, however, that for this reason the names are excluded of the Edinburgh graduates who held high office in the State during the war, while the names are included of some honorary graduates—such as General Botha and Sir Alfred Keogh—who otherwise had little connexion with the University. At the end of the volume is a list of the orders and decorations won by members of the University, including five Victoria Crosses. Although none of the five are medical men, two had been medical students. The volume, which is sumptuously produced, has been edited by Major John E. Mackenzie, who was adjutant of the University Officers' Training Corps throughout the war, and who has pursued an arduous task to a most successful end.

We print below the names of the medical graduates of the University who are included in the Roll of the Fallen:

Captain J. G. Anderson, M.C., Colonel J. H. E. Austin, Dr. A. K. Baxter, Dr. Guy Beattie, Fleet Surgeon D. R. Bedell-Sivright, Colonel C. M. Begg, Captain J. H. Beilby, Captain J. A. T. Bell, Captain T. H. S. Bell, Captain J. W. Bingham, Captain H. W. Binks, Surgeon-General W. G. Birrell, Captain E. J. Blair, M.C., Captain G. S. Blandy, M.C., Captain G. V. Bogle, Captain G. S. Brock, Captain W. Brownlie, M.C., Lieutenant J. E. Brydon, Captain W. H. Calvert, Lieutenant D. Campbell, Lieutenant J. Cattanach, Fleet Surgeon W. R. Center, Captain S. McA. F. Cesari, Captain J. J. P. Charles, M.C., Lieutenant A. L. Christie, Captain I. A. M.-M. Clarke, Captain D. Cotterill, Captain A. Cowe, Captain T. F. Craig, Lieutenant J. Crocket, Captain D. C. Crole, Lieutenant M. W. Danzig, Captain J. Davie, Captain R. H. Drennan, Major C. W. Duggan, Captain R. W. Duncan, Major G. H. Melville Dunlop, Captain J. J. Dykes, Major E. J. Elliot, Surgeon W. Everett, Captain G. D. Ferguson, D.S.O., Colonel C. C. Fleming, D.S.O., Major E. G. Ford, Captain J. D. Forrester, Captain J. W. Frew, M.C., Lieutenant N. M. Gavin, Lieut.-Colonel W. A. Gibb, Captain W. E. Gibbons, Captain D. Gilmour, Captain E. M. Glanvill, Major R. G. Gordon, D.S.O., Captain J. P. Grant, Colonel B. B. Grayfoot, C.B., Lieutenant R. D. L. Greene, Captain A. Groenewald, M.C., Lieutenant G. W. Guthrie, Captain T. E. Guthrie, Captain F. Hardie, Lieut.-Colonel N. E. J. Harding, Major A. C. Hartley, Captain T. Hayhurst, Lieutenant F. G. Heard, Captain J. H. Helm, Captain N. J. Hofmeyr, Lieut.-Colonel M. Holmes, Staff Surgeon A. O. Hooper, Surgeon H. J. Hopps, Second Lieutenant S. C. Huddlestone (Black Watch), Lieutenant J. L. Huggan, Captain G. S. Husband, D.S.O., Colonel J. Hyslop, D.S.O., Lieutenant C. C. Iles, Dr. Elsie M. Inglis, Captain M. P. Inglis, Major R. C. Irvine, Lieut.-Colonel T. W. Irvine, Captain A. Jassinowsky, Major F. N. Johns, M.C., Major F. M. Johnson, Captain G. E. Keith, Lieut.-Colonel M. A. Ker, Captain S. A. Kuny, Captain E. W. Lawrence, Major H. Ruthven Lawrence, M.C., Captain G. M. Levack, Surgeon C. W. Lewis, Captain D. P. Lindsay, Captain S. J. Linzell, M.C., Croix de Guerre, Captain A. G. S. Logie, Captain A. P. Low, Captain H. T. Lukyn-Williams, Lieutenant G. H. Lunan, Surgeon H. J. McCaw, Captain L. T. McClintock, Lieut.-Colonel W. M'Conaghy, D.S.O., Surgeon J. S. D. McCormack, Captain J. Macdiarmid, Captain I. Macdonald Brown, Captain R. G. McElney, M.C., Captain I. Macfarlane, Major J. G. Macindoe, Captain J. A. MacKenzie, M.C., Surgeon D. S. MacKnight, Captain I. Keith-Falconer MacLeod, Captain A. Macnab, Second Lieutenant R. D. M. Macpherson (Seaforth Highlanders), Captain P. C. Macrae, Major W. A. Malcolm, Lieutenant J. Marshall, Major A. A. Martin, Captain J. McD. Matheson, Colonel H. G. Melville, C.I.E., Lieut.-Colonel A. J. A. Menzies, D.S.O., Lieutenant G. H. Middleton, Staff Surgeon G. R. Mill, Lieutenant A. I. Miller, Captain R. Montgomery, Surgeon G. B. Moon, Colonel A. H. Moorhead, Surgeon A. A. Morison, Major J. Morris, M.C., Captain S. H. Morris, Captain W. Morrison, M.C., Captain K. K. Mukerji, M.C., Lieutenant J. S. Munro, Dr. T. Nelson (St. John Ambulance Brigade), Lieutenant R. F. T. Newbery, Major F. W. Niesche, Captain J. D. Noble, Captain J. McC. Orme, M.C., Captain H. S. Palmer, Captain P. Pattison, Lieutenant A. Philip, Captain A. Z. Philips, Captain G. S. Pirie, Major W. G. Porter, D.S.O. (R.F.A.), Captain O. D. Price, Dr. E. F. T. Price, Captain H. H. Proudfoot, Captain A. M. Pryce, Captain W. D. Reid, M.C., Lieut.-Colonel J. C. Renton, Captain H. Rendell, M.C., Lieutenant M. J. Richardson, Major W. R. Ridley, Captain W. Ritchie, Captain A. B. Robertson, Captain R. C. Rogers, Lieut.-Colonel A. A. Ross, Lieutenant A. B. Ross, Lieut.-Colonel C. S. Rundle, Dr. J. F. Selkirk, Lieutenant J. W. Senter, Major M. C. C. Seton, Captain J. J. Shannon, Lieutenant J. G. Sharp, Captain J. C. Simpson, Lieutenant D. W. Sinclair, Captain C. E. H. Smith, Captain H. G. Smith, Captain H. M. Spoor, M.C., Surgeon A. R. Steel, Major N. W. Stevens, Lieut.-Colonel W. M. Sturrock, Major W. Symington, Colonel F. A. Symons, D.S.O., C.M.G., Captain A. S. Taylor, Captain H. Y. C. Taylor, Captain C. Templeman, Major B. C. Tennent, M.C., Major F. G. Thatcher, M.C., Lieut.-Colonel F. W. Thomson, Lieutenant A. L. Thornley, Captain J. J. Tough, Surgeon S. N. Toulmin, Surgeon A. E. Turnbull, Captain J. K. Venables, M.C.,

University of Edinburgh Roll of Honour, 1914–1919. Edinburgh and London: Oliver and Boyd. 1921. (Cr. 4to, pp. 797; 99 plates. 40s. net.)

Surgeon-Lieutenant F. L. J. M. de Verteuil, Lieutenant J. T. Waite, Captain G. Walker, M.C., Captain A. Wallace, Captain R. N. Wallace, Surgeon J. S. Ward, Lieutenant D. G. Watson, Surgeon J. H. D. Watson, Captain W. N. Watson, M.C., Captain H. D. Welply, Captain T. Welsh, M.C., Major A. Westlake, Captain J. Wilson, Captain J. Dykes Wilson, Dr. Marian E. Wilson, Lieut.-Colonel R. E. Wood, Major J. Woods.

Correspondence.

BLOOD TRANSFUSION IN HAEMORRHAGIC DISEASE OF THE NEWBORN.

SIR,—In your issue of April 9th, 1921, p. 527, Mr. Douglas Laurie cites a severe case of melaena neonatorum successfully treated by blood transfusion. It should be realized more generally that blood transfusion, if used in time, is an absolute remedy for these cases of haemorrhagic disease of the newly born. In a few cases horse serum or human blood injected subcutaneously may be used successfully, but to ensure a cure blood transfusion is beyond any question the best and most reliable procedure. In the Hospital for Sick Children, Toronto, we prefer the syringe cannula (Lindeman) method,[1] but where this is not feasible the citrate method may be used.

The freshly introduced blood not only stops further bleeding, but replaces the lost blood. We consider the cure of the haemorrhagic condition to be accomplished practically at the end of the transfusion. The amount to be given varies with the weight of the infant, but a good working rule is not to exceed 15 c.cm. per pound of body weight. The transfusion is completed usually in ten to twelve minutes, the actual time of injection being about three to four minutes for 100 c.cm. of blood.

Mr. Laurie lays too great emphasis on the difficulty of exposing a suitable vein and in having to use a hypodermic needle to inject the blood. This difficulty is very readily overcome by exposing under local anaesthesia the internal saphenous vein where it crosses the internal malleolus. If this vein cannot be seen, it can usually be palpated and feels like a small vas deferens when rolled under the thumbnail. If it cannot be located before cutting down, it can be exposed by an incision which crosses its course. This vein is much thicker walled than the elbow veins and is more constant in its position. Small, sharp-pointed, curved eye or manicure scissors are used to make an oblique cut in the vein after applying and steadying the vein with a distal ligature. The lumen is dilated with the tips of the scissors. It is surprising how large a cannula this vein will accommodate, and I use a 1½ in. No. 17 tempered, gold serum needle with the point (but not the bevel) rounded off. A 2 in. rubber tube, armed with metal tip fitting the hub of the needle, makes the injection of blood simple.

Following transfusion, if the bleeding has been from the bowel, old dark blood is passed during the first twenty-four hours. The necessity of obtaining a compatible donor is not as great as in the case of older children or adults, as in many of the infants we have found that the agglutinins are not established at birth, or if so, are apparently weak. When the father is the only donor available, I have used him without preliminary grouping tests. If circumstances permit of it, it is safer to have a compatible donor or a universal donor (Group IV, Moss grouping) as Mr. Laurie did.

In a series of 40 cases of haemorrhagic disease of the newly born transfused at this hospital and elsewhere, four died, two of these from associated sepsis of the umbilical cord and one from intracranial haemorrhage, which was extensive before transfusion. The fourth case had bled profusely for two days, and had stopped breathing half an hour prior to admission to hospital. During that time artificial respiration had been carried out, and although the pulse was present on admission, the patient was too far gone to benefit by transfusion.—I am, etc.,

BRUCE ROBERTSON,
Assistant Surgeon, Hospital for Sick Children, Toronto, Canada.

April 29th.

[1] Bruce Robertson: The Transfusion of Whole Blood. BRITISH MEDICAL JOURNAL, 1916, vol. ii, p. 38.

HEART-BLOCK AND THE ADAMS-STOKES SYNDROME.

SIR,—In a letter published in your last issue (p. 755) Sir Clifford Allbutt gives the pathological findings of a case which exhibited the Adams-Stokes syndrome, but nevertheless showed an apparently healthy myocardium.

I am afraid the report of my paper read before the members of the Liverpool Medical Institution was not sufficiently explicit. My opinion was based not on pathological but on electro-cardiographic evidence. My personal experience of these cases is as follows:

Cases of block, complete and partial, which, apart from the lesion of the *a–v* bundle, gave a perfectly normal cardiogram, never exhibited the Adams-Stokes syndrome. In complete block these cases show a slow but a *regular* pulse rate. On the other hand, so far as my experience goes, cases which have exhibited Adams-Stokes syndrome have shown some aberration in the Q.R.S. complex—such, for instance, according to Lewis, were evidence of a defect in one of the branches of the *a–v* bundle. Apart from the disturbance of the conductivity of the main bundle there was evidence that other structures of the heart were affected.

The impression one gains from such cases is that the defect in the main bundle is really not the primary lesion, and that, on the contrary, some degenerative changes starting elsewhere have gradually affected this structure. Accordingly more often than not the degree of block is not very pronounced in such cases. But the degenerative changes of the heart muscle must be extensive in them, since not only the main bundle but one of the branches is affected. Moreover, clinically the prognosis of cases exhibiting these aberrations is very grave, if we except those instances in which the defect is due to some removable cause, such as syphilis.

But the interesting feature of these cases which has a bearing on Sir Clifford Allbutt's letter is the pathological findings. Although the gravity of the clinical symptoms must lead to the assumption of the presence of extensive pathological changes, yet a *post-mortem* examination in many instances revealed scarcely a pathological lesion (Lewis and others).

But to return to our main theme: I do not wish to be misunderstood. I do not say that the Adams-Stokes syndrome does not appear under any other circumstances than in cases which show this particular aberration. What I maintain is this: A lesion limited to the main *a–v* bundle does not give rise to an Adams-Stokes syndrome. In cases which exhibit this syndrome in addition to the defect in the main bundle some other factor comes into play. It is conceivable that in a damaged heart muscle the refractory period of the ventricle may become longer than normal after a temporary exhaustion, or a structure might become affected which is the seat of the origin of the ventricular rhythm.

Clinically and pathologically, cases exhibiting the syndrome show so many different features from ordinary heart-block that they ought to be treated as a separate entity. Ordinary block is a disease with a clean-cut pathology and a definite clinical picture. On the other hand, a great deal of work will still have to be done before the cardiac mechanism which produces the syndrome becomes clear. Evidently Sir Clifford Allbutt's case belongs to a great number of heart cases in which the present pathological methods are inadequate to discover subtle changes in some vital structure, which, in accordance with clinical evidence, must be in existence.—I am, etc.,

Liverpool, May 20th. I. HARRIS.

THE PREVENTION OF PUERPERAL INFECTION.

SIR,—As a general practitioner of twenty-seven years' experience, I feel bound to make comments upon Dr. Blair Bell's very able paper printed in the BRITISH MEDICAL JOURNAL for May 14th.

The use of gloves in midwifery, with many other men, I deprecate; they diminish the tactile sensibility of the fingers, they lead to inevitable carelessness, and the hands are clumsily washed because the accoucheur feels that they are going to be covered and it matters not. The result is that the left hand, still infected, presses on the fingers of the right glove and they are fouled. It is considered unnecessary to dip the gloves in an antiseptic; therefore, if there

be any infectious material about the vulva it is carried into the vagina without any inhibitant.

Consider, then, the conditions of an ordinary confinement. A small room with one nurse, who has to give the chloroform! Almost inevitably the patient must be moved or non-sterilized articles touched. In a nursing home or a hospital this is not necessary, but very few of the 800,000 births each year occur in hospital. No! Teach the men to wash their hands in mercury biniodide, and little else matters. When I was "charity" at Guy's Hospital twenty-five years ago and whilst I was house-surgeon such a thing as puerperal fever was never considered—it did not occur.

The unskilled students were soaked in perchloride, and yet they examined the patients continually for hours and hours. The universal experience, as far as I have heard it, is that the cases that have fever are those where little has been done and that those where there has been great interference escape infection. There is a tendency to-day to accept too readily the dicta of the aseptic people. Antiseptics are urgently required and produce brilliant results, as the experience at Guy's and other great hospitals illustrates. Even surgeons operating do not wash their hands as they did in the old days, so that frequently their gloves are infected, as their fingers, unclean, escape through holes torn in the gloves. Sterilized aprons are very charming, but dangerous. A man says they are clean, and will touch them, but the mischief has been done—the apron has touched the bed. He will not dream of touching his clothes; he feels and knows that they are dirty. After a widespread though numerically small experience, I say: Teach the accoucheurs to wash and to use mercury biniodide for everything. The present use of a few drops of lysol is useless and dangerous, because the accoucheur depends on it. There must be a bowl of biniodide 1 to 1,000 in which he can dip his hands every few minutes.—I am, etc.,

London, S.W., May 17th. VAUGHAN PENDRED.

SIR,—In your leading article you say, "Many a woman would escape infection if the attendant only arrived as the child was passing over the perineum, so that no vaginal examination could have been made." This was exactly what happened in one of the only half-dozen or so cases of puerperal infection it has been my lot to see in thirty years of general practice. I have been in a rural practice twenty-eight years, and before that I was two years in colliery and town practice. I am perfectly certain not more than half a dozen cases of puerperal infection have been seen by me in some 1,400 odd cases of midwifery. Perhaps I ought to be ashamed to admit I have never possessed a pair of rubber gloves, nor worn a pair at a confinement, and only twice seen the vulva shaved—much to the disgust of the patients, who swore they would never allow it again. Up to a year or two ago I never hesitated to make as many vaginal examinations as I liked, just to see how the labour was progressing, and never saw any harm come of it. Forceps have been employed in about 12.5 per cent. of my cases, which include one craniotomy and many where turning was required, and so far as I can remember no case of infection occurred after any bad case, except a few cases of phlegmasia alba dolens. The main point I wish to emphasize is that I have not seen a death from puerperal infection of any kind. The most serious cases of infection that have come my way have followed abortion—incomplete abortion, of course—and although I have seen many of these and some very ill, I have not seen a death. I think I can see a parallel between infection after abortion and infection after delivery at term.

It has struck me often that some of these patients ought to have become badly infected, for many a time I have seen shreds of putrid membrane passing out of the vagina after what was regarded as a perfectly normal labour, yet all went well with ordinary treatment, which consisted of keeping the vagina clean. I believe there is sometimes far too much meddling with the interior of the uterus, and if activities there were confined to simple douching little harm would come. The great majority of my midwifery has been done in cottages and under very cramped conditions and often insanitary surroundings. I fail to see what use overalls and rubber gloves can be to a man in my position, where one cannot often procure more than a couple of basins in the house and little or nothing to prepare a bed properly for a lying-in woman, and often no help beyond some old woman neighbour; and yet all these cases which ought, according to all the laws of obstetrics, to go wrong do not! My precautions are limited to carbolic acid, lysol and abundance of soap and water.

I expect I would be classed by my friends the consultants with those who are known as "dirty doctors"; but I have no intention to depart from my technique or, as perhaps they would say, the absence of it. I am not ashamed of my record, and claim no merit for anything I am saying, except that it is the truth.

One word more, and it is this: I would not care to be in the position of a young, newly-fledged practitioner full of up-to-date learning on obstetrical technique if he examined a patient in labour per rectum and not per vaginam. I can imagine his being ordered out of the house as not knowing his job! No, Sir, our investigators will have, in my opinion, to look elsewhere for their sources of infection than the dirty doctor and dirty nurse. I do not dispute that they may occasionally be at fault. In the light of practical experience, however, it would seem that they are not so frequently to blame as some authorities would have us believe, or how does it happen I have been so immune from puerperal infection in my practice? I believe cases of this disease will go on occurring now and again in hospital and out of it with every precaution, because I believe we will have the autogenetic origin always with us, and I do not see how we are going to prevent it.—I am, etc.,

May 15th. "OLD FASHIONED."

REFRACTION WORK AMONG SCHOOL CHILDREN.

SIR,—I write to support Dr. A. E. Larking's advocacy of utilizing both subjective and objective methods of estimating refraction errors (BRITISH MEDICAL JOURNAL, May 21st, 1921, p. 759), and I agree with him that three average cases per hour is as many as can be done really thoroughly.

Mr. Bishop Harman's method (with hole in blackened disc and a marked diameter—BRITISH MEDICAL JOURNAL, May 7th) is interesting and should be useful occasionally, but I differ entirely from him if his contention is, as I gather, that subjective testing (I mean as an adjunct) is useless in children "from, say, 5 to 14 years." He says "it is no use asking a child whether this or that glass is better than another, or what difference this lens of a fraction of a dioptre makes to clearness of vision." Quite so, but that is not really the way in which test-types are used. It is useless to say, "Is this glass better than that?" but if you have three or four cards and take care that lines which are supposed to correspond are not composed entirely of easily-read letters on one card and of difficult ones to read on another, then it is possible and useful to find with which glass the child reads (*not* says he sees) best.

Both retinoscopy and subjective testing contain sources of possible error, and it is obviously wise to check one method by the other in all cases where this can be done. Of course this takes longer to carry out, but real accuracy requires it, and if one has spent a few hours in fitting children with wrong glasses it is not much consolation to feel that one did as many as possible in the time.

In no class of patients, particularly in the class likely to attend eye clinics, can reliance be placed on complete cycloplegia being obtained by the home use of atropine in any form, and retinoscopy unconfirmed by subjective testing, performed on a patient with incomplete cycloplegia, is a poor thing on which to stake professional reputation and the patient's future comfort—and learning and earning capacity.

Mr. Harman is such an expert that in his hands unchecked retinoscopy will, no doubt, usually lead to a correct prescription; but the possibility of error is present even in his case, and in others less adept will frequently result in bad mistakes.

Mr. Harman's advice to learn on young adults with well-developed faculties is excellent, but a complete series of such is not usually available for the beginner. I began by learning all I could of retinoscopy and subjective testing in a hospital eye department and then doing the work for my own private patients, telling each of them to come back if not perfectly comfortable; and I would advise that

school medical officers should first learn all they can in hospital, and that when they start work in the schools should begin by selecting the older children, do both retinoscopy and subjective testing, and be content at first if they do one in forty-five minutes. One correctly prescribed for is worth any number incorrectly prescribed for.

I should like to enter a plea for the doctor doing the frame-fitting. This in the hands of an optician is frequently even worse than his sight-testing, and it can be done accurately in one minute a case when you know how, and are properly equipped.

It is unnecessary and even injurious to order very large, and especially round, lenses "to prevent the child looking over them." If the glasses are correct he will not want to look over them (if required, atropine can be continued for a week until he becomes accustomed to them), and if you make him an object of ridicule with glasses which are more than ordinarily disfiguring, he will probably wear them in his pocket.—I am, etc.,

Altrincham, May 22nd. ARTHUR T. BLEASE.

SIR,—The letter by Dr. Arthur E. Larking under the above heading in the JOURNAL of May 21st, p. 759, calls for some comments.

First, the statement that a certain education committee expects its school medical officer to do at least "six" refractions in an hour. If this does not come under the heading of "sweated labour" I should like to know what does! Secondly, I am afraid Dr. Larking has taken Mr. Bishop Harman far too literally. Thirdly, the statement that Mr. Bishop Harman has let the secret out of the bag is a piece of sarcastic criticism that must not go by unchallenged.

It would appear that Dr. Larking accuses an accomplished ophthalmic surgeon of slipshod methods in refraction work. I am sure that Mr. Bishop Harman never intended it to be taken for granted that he, or any other refractionist, always prescribes glasses from retinoscopic findings alone without confirmation by subjective tests. Mr. Bishop Harman, and any other competent refractionist, would always confirm his retinoscopy, where possible, by the subjective method, especially if there be astigmatism present of more than one dioptre. There is no need to waste time testing subjectively in hypermetropia. It is advisable to apply subjective methods also in cases of myopia. Now, so far as astigmatism is concerned, one has a little latitude in cases that take a cylinder of one dioptre or less, but in cases requiring a cylinder from one dioptre upwards then one must place the cylinder as near as possible in the proper meridian.

For the above reason no ophthalmic surgeon would ever dream of prescribing lenses from retinoscopy alone without subjective verification in cases where this is possible. If the patient is too young for subjective sight-testing, then one has no alternative but to correct any refractive error by retinoscopy alone. One meets with many such cases, but they should be examined by a thoroughly competent refractionist alone. It requires very great experience before one is competent to write a prescription for glasses with any degree of accuracy from retinoscopic examination alone. It can be done, but any capable refractionist would much rather verify his findings subjectively.

There is no "letting secrets out of the bag." It is just a matter of experience and ability. It is quite possible to test the eyesight of six children in an hour, but even an expert like Mr. Bishop Harman would not like to do this regularly for two hours at a time. I have often done it, and in addition have measured each child's face with a face-rule giving the exact measurements for spectacle frames, but I would not do it regularly for £1,000 per annum. If a person were to keep up an average of four cases an hour, and do each case properly, such a school medical officer would be a person any education authority ought to be proud of; and if they ask for six cases to be done per hour, then they are asking for faulty work.

If an education authority makes a stipulation for six cases an hour, then such authority should be reported to the British Medical Association, in order that it might take action to put down such sweating methods.—I am, etc.,

J. PARKINSON HIGHAM,

Middlesbrough, May 23rd. Ophthalmic Surgeon.

THE PREPARATION OF SCIENTIFIC PAPERS.

SIR,—The letter of Sir James Barr in your issue of May 14th is so full of literary lapses, not to say of vulgar errors, that at first it suggested a deliberate trap for editors and proof readers; but if this is not so, you, Sir, have surely scored rather cruelly by printing it uncorrected.

Literary style is an elusive thing and not easy of definition. A style may be as rugged as you please, like Carlyle's, and yet be clear and forcible, but there is a peculiar awkwardness about the sentences of Sir James Barr which an attempt to read them aloud makes evident.

To take a few of his sentences seriatim, let us begin with this: "This discovery *necessitated me verifying* the references," and, in the matter of style, note the whole sentence: "*This* discovery necessitated me verifying the references, and as I have ceased subscribing for *this* Council's periodical since its price was raised . . . *this* letter has been delayed."

A few lines lower we meet this dark sentence:

"The BRITISH MEDICAL JOURNAL seems to be no less unfortunate" (no less than what?) "in its contributors, but it is not quite plain how they display their disregard, as a negative is rather difficult to display unless it be that of a photograph." Honestly, the meaning of this cryptic utterance is beyond my powers of elucidation; it is certainly "not quite plain." I have tried it by referring "they" to the contributors, and again by taking "they" to refer to the BRITISH MEDICAL JOURNAL, but the result is equally bewildering.

Split infinitives, I suppose, we must put up with, and the child was only two years old, which is certainly some excuse. When she is older she will know better.

Referring to "unwashened hands," Sir James says: "There is no verb to unwashen, whence then the past participle?" This forcible argument had better have remained unwritten. There is no verb "to unwrite," whence then the past participle?

Take another sentence: "If photographs were excluded, there would be no danger *that* 'the inclusion of inessential details in the background leading to confusion.'" True, it only needs the substitution of "of" for "that" to make sense, but you, Sir, as above mentioned, have been cruel.

Again: "An editor should have a fair working knowledge of his own language, and be able to spell, as the latter qualification [that is, being able to spell] is not an uncommon defect in many otherwise well educated writers." Here again a writer with a real appreciation of grammatical nicety would have written "is a not uncommon defect," which is not quite the same thing as "is not an uncommon defect."

Finally, the first two words of Sir James Barr's rules illustrate delightfully the very grammatical error against which he solemnly warns us in the second rule. "Only write," that is to say do not paint, nor draw, nor sing, but only write, "when you understand what you are going to write about." What Sir James presumably wished to inculcate was "Write only when you understand, etc.": but this is not what his rule, as written, ordains.

It is the old story of Dean Alford, recurring after an interval of sixty years.—I am, etc.,

Bromsgrove, May 17th. H. CAMERON KIDD.

*** We have received a number of other letters criticizing Sir James Barr's literary style, but the points seem, in the main at least, to be covered by the above letter and that published last week. It appears, therefore, unnecessary to insert any more.

ELEMENTARY PSYCHOLOGY IN GENERAL HOSPITAL TEACHING.

SIR,—I have read with much interest Dr. William Calwell's address on the above subject published in your last issue, p. 736. I suggest that Dr. Calwell could accomplish his object by using his influence to secure the establishment of an out-patient department for mental cases at the Royal Victoria Hospital, Belfast. There are departments for such patients at practically all the "teaching" hospitals in London, and my colleagues at these hospitals will, I am sure, agree with me that the amount of material is almost more than they are able to

cope with, and affords excellent instruction for the students. It is my experience that it is an infrequent event for the "mental" cases to be of so severe a character as to require to be sent to a mental hospital.—I am, etc.,

R. H. STEEN,
Out-patient Physician in Psychological Medicine, King's College Hospital.

Dartford, May 23rd.

Universities and Colleges.

UNIVERSITY OF CAMBRIDGE.

AT a congregation, held on May 20th, it was agreed, on the recommendation of the General Board of Studies, to appoint a University Lecturer in Physics as applied to Medical Radiology, in connexion with the Special Board for Medicine, for a period of five years, with a stipend of £100 a year.

The following medical degrees were conferred:

M.B., B.CH.—C. C. Okell.
B.CH.—Man Wong; R. Hilton.

UNIVERSITY OF SHEFFIELD.

AT a meeting of the Council of Sheffield University, on May 13th, Dr. F. E. Wynne (M.O.H. Sheffield) was appointed Professor of Public Health in succession to Dr. Harold Scurfield. The appointment is in accordance with the policy of the University of associating the public health work of the city with instruction given at the University. Mrs. May Mellanby, M.Sc., was appointed demonstrator of dental histology in the department of physiology, and Drs. Ferguson, Wilson, Eric Stacey, E. Barnes, and R. St.L. Brockman demonstrators in the department of anatomy.

The Council adopted a resolution expressing its regret at the death of Emeritus Professor R. J. Pye-Smith and placed on record its appreciation of his long and distinguished services to the University as a member of the council and as professor of surgery.

The Council's thanks were accorded to the Sheffield Panel Committee for its gift of war bonds and war stock of the nominal value of £1,000 for the purpose of equipping a research field laboratory in connexion with the medical faculty of the University.

UNIVERSITY OF EDINBURGH.

A MEETING of the University Court was held on May 16th.

Mr. Francis Gordon Bell, M.D., Ch.B., F.R.C.S.Eng., was appointed assistant examiner in systematic surgery in succession to Mr. R. C. Alexander, resigned.

Among the resignations intimated was that of Dr. John Beard as lecturer in comparative embryology and vertebrate morphology.

Mr. L. V. R. Becker was reappointed for a further period of six months from April as clinical tutor to the surgical outpatient department of the Edinburgh Royal Infirmary.

Recognition was granted to Dr. John D. Comrie as an extramural lecturer in the practice of physic.

ROYAL COLLEGE OF SURGEONS OF ENGLAND.

Primary Fellowship Examination.

THE following candidates have been approved at the first professional examination for the diploma of Fellow:

L. H. Appleby, D. C. G. Ballingall, F. G. Beatty, A. Blackstock, C. E. Bond, G. A. Brookes, H. A. Brookes, G. G. Bruce, J. T. Burrell, G. M. Cameron, C. H. Carlton, S. M. Cohen, J. R. M. Collie, R. S. Corbett, R. C. Davenport, C. O. Davies, S. N. Deboo, M. R. Flynn, G. N. Golden, L. B. Goldschmidt, W. D. Hart, G. T. Henderson, C. A. Horder, L. G. Housden, M. V. Hurley, S. P. Jacobson, J. Jemson, A. R. Jones, N. A. Jory, N. E. Laurence, M. A. Lautré, K. W. Leon, A. R. Lister, C. A. Lupton, Gladys H. Marchant, J. Maxwell, Ruth E. Millar, W. Miller, L. Morris, T. D. Overend, J. A. Panton, C. M. Pearce, N. A. M. Petersen, J. E. Purves, B. T. Rose, J. P. Ross, Violet I. Russell, J. R. Smith, M. J. Smyth, W. O. Stevenson, Hilda N. Stoessiger, G. C. Swanson, D. B. Walker, A. D. Wall, E. C. Warner, F. W. Watkyn-Thomas, H. B. White, S. H. Woods.

ROYAL COLLEGE OF SURGEONS OF EDINBURGH.

Fellowship Examination.

AT a meeting of the College, held on May 18th, the following seventeen successful candidates out of fifty-six entered, who passed the requisite examinations between January 10th and 15th, were admitted Fellows:

J. P. Blockley, J. W. Burns, A. C. Clark, W. A. Cochrane, T. Colley, C. C. H. Cuff, C. W. Graham, J. M. Hyde, V. J. F. Lack, T. Lindsay, Helen M. McMillan, W. Mercer, Mabel L. Ramsay, G. C. Scantlebury, S. Scoular, G. H. Stevenson, S. G. Whitfield.

The Bathgate Memorial prize, consisting of bronze medal and set of books, has, after a competitive examination in materia medica, been awarded to Mr. J. M. McLintock, and the Ivison Macadam Memorial prize in chemistry, consisting of bronze medal and set of books, to Mr. J. Harkness.

CONJOINT BOARD IN SCOTLAND.

THE following candidates, having passed the requisite examinations, have been admitted Diplomates in Public Health:

R. B. Watson, R. B. Stewart, C. C. Brown, J. S. Elliot, J. B. Primmer, D. A. Cadman, A. I. Meek, J. Singh, J. C. Simpson, N. S. R. Lorraine, C. Milne, G. G. S. Johnston, D. T. M. Large, G. P. Taylor, Jane E. Hay.

Obituary.

GEORGE BLUNDELL LONGSTAFF, M.A., M.D., F.R.C.P.

THE death took place on May 7th, at his residence, Highlands, Putney Heath, of Dr. George Blundell Longstaff, in his 72nd year. Dr. Longstaff was the son of Dr. G. D. Longstaff of Wandsworth, and he was educated at Rugby, at New College, Oxford, where he graduated M.A. and M.B. in 1876, and at St. Thomas's Hospital, where he was a Mead medallist. He further obtained the diplomas of M.R.C.P., M.R.C.S., and the D.P.H. in 1877. He became a Fellow of the Royal College of Physicians in 1888, and took the degree of M.D. in 1891. Dr. Longstaff, so far as we are aware, never engaged in the practice of medicine, but he found his medical knowledge of value, at the time, for instance, of the Jamaica earthquake, for, happening then to be in Jamaica, he did a great deal of medical work among the people of the island. Dr. Longstaff devoted his life to philanthropic, municipal, and scientific work. He was for many years a member of the London County Council, and acted as chairman of the Building Act Committee. He served on many committees of the Charity Organization Society, had been a Poor Law guardian, was a Justice of the Peace, and a member of the Wandsworth District Board of Works. His father had been the first chairman of the Wandsworth Library Commissioners, and he himself joined the Board and succeeded his father as chairman. An ardent entomologist, he was a great collector, and the Hope Collection in the Oxford University Museum has been more than doubled by contributions he presented to it. He was the author of *Butterfly Hunting in Many Lands*, which was published in 1912.

A member of many learned societies, he had been vice-president of the Royal Statistical Society and of the Entomological Society, and was an authority on the analysis of animal and vegetable oils. Dr. Longstaff had served as one of the old Volunteers, and when the special constables were enrolled in 1914, at the outbreak of war, was one of the first to join; he became the first Chief Inspector of the Wandsworth Section, and attended keenly to his duties until ill health compelled him to resign in 1917. He was twice married, his second wife being a Fellow of the Geological Society, who was awarded the Murchison Geological Fund in 1898, and who has made many contributions to the publications of the Geological, Linnean, and other learned societies. Dr. Longstaff's philanthropic, educational, political, and scientific activities made him one of the best-known and most highly esteemed public men in South London, where his loss will be greatly felt.

WE regret to announce the death, at Stewarton, Ayrshire, on May 8th, of Dr. THOMAS WATT, who was one of the best known medical practitioners in Paisley, where he had practised for over thirty-five years. Dr. Watt was educated at Glasgow University, where he first graduated M.A., and later qualified in medicine by graduating M.B., C.M., in 1886. He was senior visiting physician to the Royal Alexandra Infirmary, Paisley, and medical officer to the Post Office. He took a particular interest in the campaign against tuberculosis and in the establishment of sanatoriums for the borough and county. He had paid much attention to the question of a wholesome milk supply, and had travelled in Germany, Denmark, and Holland with a view to extending his knowledge on this subject. Dr. Watt, who had been in poor health for some time, was 59 years of age; he is survived by his widow, a daughter, and two sons, one of whom is carrying on his father's practice at Paisley.

LIEUT.-COLONEL THOMAS RANKIN MACDONALD, Bengal Medical Service (retired), died at Inverness on May 8th. He was born on May 17th, 1853, educated at Edinburgh, where he graduated M.B. and C.M. in 1876, having pre-

viously taken the L.R.C.S.Edin. in 1875, and at Vienna, and entered the I.M.S. as surgeon on March 31st, 1880, becoming lieutenant-colonel after twenty years' service, and retiring on June 20th, 1900. While on furlough prior to retirement he took the F.R.C.S.Edin. in 1899, and after retiring was for a time in partnership with his uncle, the late Dr. MacLeod of Hawick, after which he settled in Inverness. He served in the Egyptian war of 1882, was at the battle of Tel-el-Kebir, and received the medal with a clasp and the Khedive's bronze star. He was also one of the I.M.S. officers deputed to Egypt for special cholera duty in 1883. The rest of his service was mostly passed in civil employ in Burma and Bengal.

Medical News.

H.R.H. THE DUKE OF YORK will open King George's Sanatorium for Sailors, a branch of the Seamen's Hospital Society, Greenwich, at Bramshott, Hants, on July 12th.

MADAME CURIE has been presented by the President with a gram of radium subscribed for by women of the United States. She has received the honorary degree of LL.D. from the University of Pennsylvania and that of M.D. from the Women's Medical College, Philadelphia.

DR. RUSSELL J. REYNOLDS has been appointed radiologist to Charing Cross Hospital, in succession to the late Dr. W. Ironside Bruce.

THE annual dinner of the Harveian Society will be held on Wednesday, June 22nd, at 7.30 p.m., at the Café Royal, Regent Street, W.

THE medical conference arranged by the Industrial Welfare Society will be opened at 51, Palace Street, London, S.W., on June 2nd, at 10.30 a.m., when Dr. R. M. Wilson will introduce the subject of "Medical service in industry." In the afternoon the subject of "Health problems in industry" will be discussed by Professor E. L. Collis, Dr. T. M. Legge, and Dr. Halford Ross.

A MEETING convened by Dr. Marie Stopes will be held at Queen's Hall on May 31st, at 8.30 p.m., to discuss "Constructive birth control." The speakers will include Dr. Jane Lorimer Hawthorne and Dr. C. Killick Millard.

DR. W. J. HOWARTH, C.B.E., medical officer of health for the City of London, has been elected President of the Society of Medical Officers of Health for the session 1921–22; he will take office in October next. The honorary fellowship of the society has been conferred on Dr. Alfred Hill, formerly medical officer of health for the city of Birmingham, "for long and distinguished services to preventive medicine and public health administration." Dr. Hill, who has just entered his 96th year, was president of the society in 1886 and 1887. The annual provincial meeting of the Society will be held on Saturday, June 11th. Members will assemble at the house of the Society at 10.30 a.m., and proceed by motor coach to Hatfield House, which will be visited by invitation of Lord Salisbury. Afterwards the party will be entertained at luncheon at Welwyn Garden City by the president of the Society, Dr. F. E. Fremantle, M.P. The Welwyn housing and town-planning schemes will be inspected, and Mrs. Fremantle has invited members to tea at Bedwell Park. Members who intend to be present are asked to give early notice to the Executive Secretary, 1, Upper Montague Street, Russell Square, W.C.1, stating if they will be accompanied by ladies; 10s. 6d. should be forwarded for each motor coach ticket.

AT the Marylebone Police Court, on May 9th, Hugh Morton, of Park Lane (formerly of 15, Cavendish Place), appeared to answer three summons under the Venereal Diseases Act, and one summons under the Medical Act, issued against him at the instance of the Medical Defence Union, Limited. The facts upon which the prosecution relied were admitted by the defendant, and the magistrate, after hearing counsel and without calling witnesses, imposed a penalty of £30 in respect of each offence under the Venereal Diseases Act, and £20 in respect of the offence under the Medical Act, with five guineas cost on each summons; and sentenced the defendant to two months' imprisonment in default of payment of the fines and costs within seven days.

THE Inland Revenue authorities received in the financial year ending March 31st, 1920, the sum of £1,332,661 in payment of patent medicine labels in Great Britain alone, an increase of £266,967 over the amount received under the same head in the previous financial year. The duty on the labels varied from 3d. to £2, according to the price of the medicine. The number of licences issued to makers or vendors of patent medicines in Great Britain during the financial year 1919–20 was 41,671, yielding a net revenue of £10,421; the corresponding figures in the previous year were 39,675 and £9,920.

THE summer meeting of the Section of Laryngology of the Royal Society of Medicine will be held on June 2nd, 3rd, and 4th. On the afternoon of Thursday, June 2nd, and on the morning of Friday, June 3rd, a number of papers will be read and cases shown; while on the afternoon of June 3rd a number of special demonstrations will be given, followed by the ordinary meeting of the Section. A dinner will take place in the evening at the Trocadero Restaurant. On the morning of Saturday, June 4th, the laryngological staffs of University College Hospital, the Central London Ear and Throat Hospital, and other hospitals will perform special operations.

THE British Congress of Gynaecology and Obstetrics will hold a meeting at the Queen's Hotel, Birmingham, on Friday and Saturday next, June 3rd and 4th.

THE Belgian Minister of Sciences and Arts, in response to the request of the Faculty of Medicine, has resolved to create a chair of psychiatry at the University of Ghent.

DR. KENNETH E. ECKENSTEIN, pathologist to the French Hospital, London, who served during the war as a medical officer in the French army, has received the honour of Chevalier of the Legion of Honour.

DR. CHARLES ABADIE of Paris was entertained at a banquet on May 12th in celebration of his medical jubilee.

THREE post-graduate courses, conducted by the pediatric, obstetrical and gynaecological, and oto-rhino-laryngological clinics respectively, will be held in the University of Naples, commencing on May 30th and continuing for two to three months. The courses will be of a practical character, and the numbers will be limited.

DR. HUBERT WORK, president of the American Medical Association, has been appointed by President Harding First Assistant Postmaster-General.

DR. CANUYT, a former clinical assistant of Professor Moure, has been appointed to take charge of the department of oto-rhino-laryngology in the faculty of medicine at Strasbourg.

AN exhibition of radiographs will be held by the Röntgen Society in the Royal Photographic Society's rooms, 35, Russell Square, W.C., during the month of June. The exhibition will be open daily (Sundays excepted) from 10 a.m. to 5 p.m., and all who are interested are invited to attend.

A POST-GRADUATE course in medicine, particularly on the application of laboratory methods to diagnosis, will be held during July next at the Hôtel-Dieu, Paris, under the direction of Professor Maurice Villaret, with the co-operation of a large staff. The course will begin on Monday, July 4th, and will include thirty-two lectures and demonstrations, taking place thrice daily. The fee is 150 francs, and a certificate will be given at the end of the course. Particulars may be had from the secretary of the Faculty of Medicine, University of Paris. In connexion with this course a tour of study has been arranged, from July 9th to 17th, to the spas of the Pyrenees, the detailed programme of which can be obtained from Dr. Dausset, at the medical clinic of the Hôtel-Dieu.

THE report of the Home Service Ambulance Committee for the first quarter of the year shows that the institution of an ambulance service in the country has been justified by the work that the vehicles have accomplished. It is now two years since the inauguration of the scheme as part of the peace work of the Order of St. John and British Red Cross Society, and the successive reports prove that as the existence of the ambulances has become known, steady progress has been made in their use for the transport of the sick. The number of cases carried during the March quarter was 11,393, being 3,629 in excess of the total for the previous quarter. The Committee is recalling the old ambulances used during the war as they become unfit for service and replacing them by new ambulances of a lighter type; this change, it is hoped, will have several advantages, including a reduction in the cost of maintenance.

ACCORDING to the New York *Medical Record*, the prohibition director for Illinois has announced that each of the 2,000 druggists of Chicago may withdraw 200 gallons of whisky and 200 gallons of wine every three months. The commissioner of internal revenue has announced that this quantity could be increased if the druggists could show that they really needed more liquor to supply the demand. At this rate Chicago will use 3,200,000 gallons of wine and whisky a year for her 3,000,000 inhabitants.

Letters, Notes, and Answers.

As, owing to printing difficulties, the JOURNAL *must be sent to press earlier than hitherto, it is essential that communications intended for the current issue should be received by the first post on Tuesday, and lengthy documents on Monday.*

CORRESPONDENTS who wish notice to be taken of their communications should authenticate them with their names—of course not necessarily for publication.

AUTHORS desiring reprints of their articles published in the BRITISH MEDICAL JOURNAL are requested to communicate with the Office, 429, Strand, W.C.2, on receipt of proof.

IN order to avoid delay, it is particularly requested that ALL letters on the editorial business of the JOURNAL be addressed to the Editor at the Office of the JOURNAL.

THE postal address of the BRITISH MEDICAL ASSOCIATION and BRITISH MEDICAL JOURNAL is 429, Strand, London, W.C.2. The telegraphic addresses are:

1. EDITOR of the BRITISH MEDICAL JOURNAL, *Aitiology, Westrand, London;* telephone, 2630, Gerrard.
2. FINANCIAL SECRETARY AND BUSINESS MANAGER (Advertisements, etc.), *Articulate, Westrand, London;* telephone, 2630, Gerrard.
3. MEDICAL SECRETARY, *Mediocra, Westrand, London;* telephone, 2630, Gerrard. The address of the Irish Office of the British Medical Association is 16, South Frederick Street, Dublin (telegrams: *Bacillus, Dublin;* telephone, 4737, Dublin), and of the Scottish Office, 6, Rutland Square, Edinburgh (telegrams: *Associate, Edinburgh;* telephone, 4361, Central).

QUERIES AND ANSWERS.

SELF-NOTIFICATION.

"Q.", who was suffering from malaria and trench fever, notified the M.O.H. on the official form; he has not received payment. He asks whether a medical practitioner is ever justified in notifying himself as a case of infectious disease, and if so, whether he is entitled to a fee.

*** The Infectious Disease (Notification) Act, 1889, and subsequent General Orders require a medical practitioner upon becoming aware that a person upon whom he is in medical attendance is suffering from certain specified diseases, to send to the medical officer of health of the district a notification of the case. The local authority must pay a fee to the medical practitioner for this service without further demand on his part. Failure on the part of the practitioner to send the notification renders him liable to a fine. It is conceivable that the practitioner might himself be the patient and that he might be in "medical attendance" on himself, in which case he must send a notification to the medical officer of health and is entitled to the fee.

SUMMER PRURIGO.

DR. H. B. BINKS (Merthyr Tydfil) asks for advice in the treatment of a boy of 12, pale and freckled, who has suffered every summer for the last five years from a vesicular eruption on the exposed parts of the face and neck. The vesicles are at first the size of a pinhead; they gradually become more opaque and turbid, and then show dark in the centre. Unless reinfected they dry off without leaving a visible scar.

*** A dermatologist to whom the question has been referred writes: The history of this patient suggests that he suffers from a form of summer prurigo, a disease first described by the late Sir Jonathan Hutchinson. The fact that he is freckled is a point slightly against this diagnosis. Freckles are the natural reaction of the skin to the stimulus of strong light, and their presence should protect it against inflammatory lesions such as those described. Treatment is not easy; care should be taken to shield the face and neck by wearing a wide-brimmed hat, and the use of a red veil has been recommended; this might be a practical measure for a girl but hardly for a boy. The discomfort arising from the eruption can be allayed by the use of the ordinary cooling lotions containing calamine, zinc oxide, and glycerin. There is a tendency for the eruption to lessen with the advent of adolescence.

INCOME TAX.

"T. A. S." bought, in March, 1921, in conjunction with a partner, a practice in which he had been acting as assistant.

*** The two partners are assessable as for 1921–22 on the basis of the three years' profits of the practice to December 31st, 1920, or March 31st, 1921, if more convenient. Those profits were the earnings of the practice after the salary to "T. A. S." had been deducted, and the Acts contain no provision which would authorize the Revenue authorities to compute the profits in any other way. For the purpose of calculating the tax due, the gross assessment so arrived at should be shared between the present partners on the same basis on which their actual profits are shared.

"A. A.," who is tuberculosis officer to a county council, receives an allowance for expenses computed on the basis of the cheapest means of conveyance, tram, bus, etc.; in fact, he uses a motor car and so saves several hours a week. He asks if he is entitled to deduct from his salary his out-of-pocket expense on the car.

*** The emoluments in question fall under Schedule E and expenses can be deducted only if "incurred wholly, exclusively, and *necessarily* in the performance of the duties." We think that our correspondent could not establish to the satisfaction of the Commissioners hearing the appeal that the additional expense of locomotion incurred by him was necessary in the performance of the duties, in which case his claim would fail for lack of proof.

LETTERS, NOTES, ETC.

"E. G. C."—Tanned human skin becomes so dark that without a microscopic examination it would not be safe to decide if it was that of a white or a coloured person. If our correspondent could furnish a small piece, we will endeavour to have the question determined.

DIFFERENTIAL STAINING OF CARCINOMATA.

DR. A. G. SHERA, in a further letter which may well end this correspondence, writes that he did not accuse Dr. Knyvett Gordon of inexperience, but only that "the mature opinion of an *expert histologist* would be more satisfying." The expert histologists in this country, in the opinion of one well able to judge, may, Dr. Shera says, be counted on the fingers of two hands. The method referred to is being tried out in expert hands, so that Dr. Shera feels that the last word in criticism is not yet uttered.

SIGNS AND SYMPTOMS.

"CLINICIAN" writes, with reference to a recent correspondence on this subject: Evolution is essentially a physiological (defensive) process. It is physiological at first, secondly anatomical, and finally a fusion of both. It is a property or process of the biological (that is, living) world, in which man is the Z of its alphabet. When man is attacked by disease we have "warfare in the human body," and when this war is heard by the patient and told to his doctor, it is a *symptom* of its presence; and when it is felt by the patient or his doctor, it is a *physical sign* of its presence.

TWINS.

DR. C. A. ENSOR (Anerley Park, S.E.) writes: A few days ago, whilst inquiring into the family history of a patient, I elicited the following facts: (1) Her mother had had twins thrice; (2) three of the patient's sisters have had twins twice; (3) she herself has had twins three times, but at birth was a "singleton."

PARABOLIC REFLECTOR LAMP.

THE safety parabolic reflector oil lamp made by Mr. J. Bruce (232, Borough High Street, London, S.E.) has been used in Guy's Hospital for the past twenty years, and is well known to a good many members of the medical profession. Inspection of the sample we have lately received suggests that the quality of the workmanship and material is well maintained. By the use of the plated parabolic reflector a bright light can be concentrated on any part of a room. The lamp should be especially useful in country consulting rooms and surgeries where electric light is not available; it can be used either as a hand lamp or hung on a wall. The price of the nickel-plated form is 10s. 6d., post free to addresses in the United Kingdom.

VACANCIES.

NOTIFICATIONS of offices vacant in universities, medical colleges, and of vacant resident and other appointments at hospitals, will be found at pages 31, 32, 33, 34, 35, 38, and 39 of our advertisement columns, and advertisements as to partnerships, assistantships, and locum tenencies at pages 36, 37, and 38.

THE appointment of certifying factory surgeon at Peterculter (Aberdeen) is vacant.

SCALE OF CHARGES FOR ADVERTISEMENTS IN THE BRITISH MEDICAL JOURNAL.

	£	s.	d.
Six lines and under	0	9	0
Each additional line...	0	1	6
Whole single column (three columns to page)	7	10	0
Half single column	3	15	0
Half page	10	0	0
Whole page	20	0	0

An average line contains six words.

All remittances by Post Office Orders must be made payable to the British Medical Association at the General Post Office, London. No responsibility will be accepted for any such remittance not so safeguarded.

Advertisements should be delivered, addressed to the Manager, 429, Strand, London, not later than the first post on Tuesday morning preceding publication, and, if not paid for at the time, should be accompanied by a reference.

NOTE.—It is against the rules of the Post Office to receive *poste restante* letters addressed either in initials or numbers.